The Design of Disability Products with Special Reference to the User.

Case Study: Domestic Seating for Young Adults with Arthritis.

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15.4.02

PAGE NUMBERING AS ORIGINAL

1 Amendments following the Viva Voce

This thesis contains several amended sections following its submission in April 1999.

The aim is to clarify and extend ideas examined in the thesis and subsequently raised at the viva voce (31st March, 2000). Points outlined by the examiners are listed below. Any modifications are printed on yellow paper.

1. 'Redefine the objectives with a view to explaining the novelty of the approach to design in general, independent of its application to the specific disability issues.

2. The inclusion of a section after the literature review demonstrating the standard design process and how the approach in this thesis operates in relation to the requirements of the project.

3. Conclusions must clearly summarise how design solutions have been achieved by the process adopted in the thesis.

4. The postulates 5 and 6 to be written up within the conclusion.

5. The re-analysis of the data to reveal important insights into the nature of this disability and its impact on individual lifestyles. The use of statistics is suggested.

6. A greater clarification of the original contribution to knowledge.'

2 Abstract taken from Addendum document.

Values, which shaped the approach to this project and thesis, were identified through contextual research. This consisted of secondary and primary research:
Secondary sources included visual and literary information on disability-related products; approaches to design; a contemporary perspective of disability; arthritis; seating and seating recommendations. Primary research involved surveys of the seating that younger people with arthritis have, need and desire; furniture designed working with product users and a critical evaluation of tested prototypes.

The project's ethos of user participation emanated from contemporary understanding of disability and design documented in the contextual research. Working closely with product users brought about designs that could not have been achieved in isolation or directly from the secondary sources.

A design brief was derived from the contextual research. Through creative practice concepts were developed and a chosen solution applied to a practical design project – domestic seating for young adults with arthritis. A chair, footrest and cabinet were designed and critically appraised, in their sketch development, mock-up and prototype form, by a group of product users. Ideas were revised and advanced by consulting the users and acting on their observations and advice. Further refinements could be made to the design prototypes through this iterative process.

The testing programme was vetted by the University's ethics committee to confirm its appropriateness. Ten adults, 16-46 years, with arthritis, experimented with the prototypes in their own home and kept a diary. They were interviewed twice, once before their seating trial to describe their existing seating arrangements and once after to rate their views and give their 'gut-reactions' to the seating's functional and aesthetic qualities. These interviews were recorded and transcripts were made and analysed. Each participant was thanked for their involvement.

Valuable criticisms of the prototypes arose, less obvious human concerns surfaced and personal fancies were expressed regarding: the satisfaction of the posture and positioning; the choice of finishes; a sense of 'ownership'; appropriateness to lifestyle and the ability to service people's established habits. Care was taken to

retain the individual nature of participant's observations and recommendations, these were grouped by topic from which design case study and project conclusions were made.

Product satisfaction depended on the relevance of the information gathered and how it was interpreted and developed into a design. With the participation of product users it is possible to design to include individuality, rather than for a constituency solely defined by their impairments.

For examination purposes, two and three dimensional design work accompany this written thesis and were available during the viva voce.

3 List of contents

4 List of illustrations or tables

5 List of accompanying material

material available during viva voce

Slides

Mock-ups

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footrest

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Chair, cushions & day blanket

Footrest

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A3 Photograph Journals

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Seating Survey

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Raw data:

Home Testing:

Initial interview tapes & transcripts

Diaries and diary transcripts

Post-Testing/Collection tapes & transcripts

Original Sketch development work: unbound A3 drawings

Presentation boards

6 Preface

6.1 Author's bias towards the project

My first degree was Three Dimensional Design specialising in furniture. I was trained to define a concept, design and produce a prototype.

At postgraduate level many of my contemporaries chose further study in furniture design, exploring manufacturing, furniture as art and new materials. My interests lay in needs based design and how a person could benefit from an appropriate product. This led me to a medical model bias masters degree, where the syllabus included anatomy and physiology, and pathology. Lecturers were physiotherapists, designers, consultants and paramedics, they were not people who discussed their own disabilities. Although through our elective project work as students we worked with disabled people, in our study, they tended to be in the position of 'object', explored from the outside.

At the end of my masters course I was more aware of the complexities involved. Designing disability products is not just a matter of meeting functional requirements. The results of my masters degree proved that although my product concept made tasks more straight forward in the testing process, the participant's feelings were ambivalent: they did not like the colour of the test rig, so responded negatively to the overall idea; or one participant felt he would feel 'lazy' if he used a design that made life easier.

This project presented an opportunity to work further in this area and gain an understanding of how best to design a product that is useful and desirable to a disabled user. I had the opportunity to consider my own attitudes and prejudices. This has indirectly affected my approach to the project, forming a context for my main philosophy: appropriate design can support physical human needs and has the potential to optimise ability and reduce disabling situations.

I also had occasion to find out more about my own arthritis. Diagnosed as having Juvenile Arthritis at the age of four I have had residual effects ever since. I was able to consider my own experiences as I designed and also to empathise with participants

I met during the project. Because relatively informal contact was established with the user group, they were ready to offer criticisms and advise to adapt ideas which were considered unpopular. I was satisfied that the people involved in the testing programme were not 'objectified'.

As a furniture designer, the project is both theoretical and practical. Visual and literary sources have been used in contextual research. The case study generated visual references and three dimensional artefacts and products, during the design development process.

This written thesis is seen as a means of documenting the details and influences of the case study and the overall project, setting them in context at a point in time. It also provides a platform on which to build future projects, to act as a reference to other related projects or even those in other disciplines.

6.2 Interpreting and changing the title

The starting point for this research project was a single sentence title. It was originated by staff in the School of Art and Design. At the University, each researcher interprets their title and puts their work into context in order to make a contribution to knowledge within that field. As my understanding and interpretation of design and disability has developed so has my title.

The title was initially 'The Design of Prescribed Medical Equipment and its Use By Patients Outside of the Clinical Environment', but finding that people's recovery from illness and success in rehabilitation was greater with an individual's pro-active attitude (Partridge & Johnston, 1989)[1], prompted a re-wording of the title to: 'The Design of Medically Related Products Used Outside the Clinical Environment with

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[1] '... coping by those with more internal beliefs is more adaptive in stressful situations and, in particular, that level of internal locus of control may predict better health outcomes in patients with physical disabilities.' p57
Partridge, C. & Johnston, M. (1989) Perceived control of recovery from physical disability: Measurement and prediction, British Journal of Clinical Psychology, vol. 28, p53-59

Special Reference to the User'. 'Patient' became a 'user' and the 'prescribed medical equipment' became a 'medically related product'. This changes the connotation of dependence, having things given or done by some 'powerful other'. It is also more specific in product design terms.

This title caused unease amongst people in the field of Disability Studies, reacting strongly to the mention of 'medically related products'. After much reflection, a final change was made to 'The Design of Disability Products with Special Reference to the User. Case Study: Domestic Seating for Young Adults with Arthritis'. This accurately describes the work (it is more readily understood by people who enquire as to my work) and the thesis can be identified in a subject search and reach a wider readership.

I arbitrarily used Young Arthritis Care's definition of 'younger', i.e. under 45 years. Otherwise the exact age of the person has little significance for the project.

6.3 Project objectives

The broader project objectives, seen outside of the context of disability issues:
The project's objective is to develop a methodology that can identify subtle design criteria. By working in this way, not only can a functional product be designed, but importantly one that is acceptable, appropriate and desirable to the user.

The novelty of approach to design in general is the core of consultation with the product user throughout the development process. Notably considering the user group to comprise of individuals with subjective values, thus necessitating that the criteria are identified through a series of increasingly intimate phases, i.e. postal surveys, group design meetings and individual interviews using two and three dimensional prompts.

Using qualitative notions[2] the data is faithfully sifted. The conclusions of each stage are interpreted by a design practitioner in the design of a product. A resultant product

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[2] '... using the subjects' words better reflect the postulates of the qualitative paradigm. The qualitative researcher looks to understand a situation as it is constructed by the

or group of products can be directly influenced in form and visual identity by user input.

6.4 Requirements of the project

A process[3] of consultation was developed, making special reference to the product user, that enabled the identification of design criteria which were then used in the design of medically related products. These products specifically address the consequences of physical impairment and are for use in the home environment.

The 'unique selling point', in marketing terms, of these products is the way in which they have been developed in close interaction with the user: by meeting the user's functional, aesthetic and psychological criteria. Care was taken to avoid abstracting the product's function from the users' needs and desires.

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participants. The qualitative researcher attempts to capture what people say and do, that is, how people interpret the world.' Maykut, P. & Morehouse, P. (1994) Beginning Qualitative Research, A Philosophic & Practical Guide, The Falmer Press, London & Washington D. C., p18

'To do this requires an empathic understanding or the ability to reproduce in one's own mind the feeling, motives and thoughts behind actions of others (Bogden and Taylor, 1975: 13-14). *In* (Ibid.)

'The task of the qualitative researcher is to find patterns within those words (and actions) and to present those patterns for others to inspect while at the same time staying as close to the construction of the world as the participants originally experienced it' (Ibid., p18)

'Further, to present the results of the research to the participants in a manner which they can understand is to included the participants in the discovery. If the knower and the known are interdependent (Postulate II) then there must be integrity between how the researcher experiences the participants in the study, how the participants experience the situation and their participation in it and how those results are presented.' (Ibid., p18-9)

[3] 'Process *n* a state of being in progress or being carried on; course; a series of actions or events; a sequence of operations or changes under gone.... *vt* to subject to a special process; to arrange (documents etc.) systematically; to examine and analyse...' (Schwartz, 1992, p857)

Thus avoiding situations which have arisen, and have been documented, whereby products have been issued by health professionals only to be stowed away by the intended user because of a complex web of feelings and views: such as the product looks too medical, does not match their home, they have negative associations about their situation so transfer these onto the product.

6.5 Originality of project: Designing with an Understanding of Sociological Models

My original contribution to design has been to design with an understanding of sociological models, valuing the product user's comment enough to use it to influence the design of a product.

The design research project began from a medical model and positivist[4] perspective. The initial intention was to consult with medical practitioners, manufacturers and users of products with equal weight, beginning with clinical products and de-institutionalising them.

However, after an early questionnaire session with a group of Occupational Therapists, having worked with them on a design and disability course, it became clear that the sort of information I was most interested in would come from the product users themselves. I was interested in their experiences of mobility impairment and how that effected their psychological & aesthetic acceptance of the

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[4] 'The word positivism was first coined by Auguste Comte as early as the 1830's and for Comte positivism was synonymous with science or discussion of the history of science, positivism has come to mean objective inquiry based on measures variables and provable propositions. The positivist research orientation holds that science is or should be primarily concerned with the explanation and the predication of observable events (Kincheloe, 1991). It is the insistence on explanation, prediction, and proof that are the hallmarks of positivism.' (Maykut & Morehouse, 1994, p3)

product, rather than just their functional ability[5]. This was obtained via the product user's subjective opinions.[6]

The importance of the user's input, to the exclusion of the other parties, became paramount in the project development and this urged a paradigm shift[7] to a social model of disability and to qualitative research,[8] with its dialogue-centred research that best suited the project.

It was essential that the participants were asked questions in a sensitive manner, since some of them were recent acquaintances and some issues relating to their disabilities

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[5] 'Phenomenological approach is a focus on understanding the meaning of events have for persons being studied (Patton, 1991). The phenomenological approach to inquiry includes qualitative research but also has under its umbrella such ideas as inquiry as ethnomethodology, symbolic interactionism, hermeneutic inquiry, grounded theory, naturalist inquiry, and ethnography.' (Patton, 1991)... 'The Phenomenological position sees the individual and his or her world as co-constituted. In the truest sense, the person is viewed as having no existence apart from the world, and the world as having no existence apart from the person.' (Valle & King, 1978 *in* Ibid., p3)

[6] 'The traditional position has had the advantage of define objective and subjective as they relate to research. Therefore, objective has come to mean true, factual and real. By default subjective has come to mean partially-true, tentative and less-that-real... An object is a thing, an entity. An object is other; to be objective is to make something into other. To be objective is to be cold and distant. Within this framework, subjective also takes on a different meaning - to be subjective is to be aware of the agency, that is, of action. From the phenomenological point of view, subjective is synonymous with the agency or with the actor's perspective. To be subjective, therefore is to 'tend to' the subject. The speech patterns and behaviour of actors or agents and the specific context in which these behaviours occur...' (Ibid., p20)

[7] 'A paradigm has come to mean a set of overarching and interconnected assumptions about the nature of reality... paradigm provides the largest framework within which research takes place. It is the worldview within which research takes place...' (Ibid., p4)

[8] 'Qualitative research, ... generally examines people's words - and actions in narrative or descriptive ways more closely representing the situation as experienced by the participants.' (Ibid., p2)

could possibly be emotive. The position of researcher/ researched[9] was also considered, with potential reassurance offered to the participants by actually having arthritis myself thus being part of the user group and by sharing information that was considered useful to a person with arthritis looking for seating recommendations.[10]

Over thirty hours of user interviews were transcribed and areas flagged as important, sifting significant comments into like groups, and observing their recurrence.[11].

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[9] 'Epistemological assumptions concern the origins of knowledge. What is the relationship between the knower and the known? What role do values play in understanding? are important epistemological questions. Logic deals with principles of demonstration or verification.' (Ibid., p3-4)

[10] 'Further, to present the results of the research to the participants in a manner which they can understand is to included the participants in the discovery. If the knower and the known are interdependent (Postulate 11) then there must be integrity between how the researcher experiences the participants in the study, how the participants experience the situation and their participation in it and how those results are presented.' (Ibid., p18-9)

[11] '... using the subjects' words better reflect the postulates of the qualitative paradigm. The qualitative research looks to understand a situation as it is constructed by the participants. The qualitative researcher attempts to capture what people say and do, that is, how people interpret the world.' (Ibid., p18)

'The task of the qualitative researcher is to find patterns within those words (and actions) and to present those patterns for others to inspect while at the same time staying as close to the construction of the world as the participants originally experienced it.' (Ibid., p18)

6.6 Original contribution: Synthesis

Discrete works have been documented on the following subjects. However, this project is the first time they have been combined and applied to a practical outcome.

1) measuring comfort & testing comfort
2) posture
3) seating recommendations
4) testing chairs
5) anthropometrics
6) ergonomics
7) disability products and people with arthritis
8) disability products & disabled people
9) use of disability products at home
10) self help/ daily living for people with arthritis
11) standards on strengths & stability/ materials
12) images of disability
13) disability rights
14) issues in disability studies
15) qualitative research
16) design research
17) good design
18) designing equipment for physically disabled people
19) design & ageing
20) defining impairment & disability

See **Appendices** for the full set of end notes. **(5. Original Contribution: Endnotes)**

7 Author's declaration

A thesis submitted in partial fulfilment of the requirements of the University of Wolverhampton for the degree of Doctor of Philosophy.

This work or any part thereof has not previously been presented in any form to the University or to any other body whether for the purposes of assessment, publication or for any other purpose (unless previously indicated); save for any express acknowledgements, references and/or bibliographies cited in the work, I confirm that the intellectual content of the work is the result of my own efforts and of no other person.

The right of Lucy E. C. Poole to be identified as author of this work is asserted in accordance with ss.77 and 78 of the Copyright, designs and Patents Act 1988.
At this date copyright is owned by the author.

Signature:

Date:

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Mr Pickersgill Upholster in Belper

David Breese at Lloyd Loom

Eda Agnes Day at Derby University

People on foam stall at Ron Hardy

EM Marsh, Upholstery shop, Wolverhampton

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Mary Little

John Miller

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Robert Smith at *PTC for stress analysing* a section of the chair structure

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Rover, Coventry

Occupational Therapists, Cannock

Occupational Therapists, Walsall

Occupational Therapists from Wolverhampton/Worcester

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Professor Keith Cummings, *Director of Studies*

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9 Introduction

This thesis details the attention involved in designing for a wider spectrum of the population, by concentrating on meeting and satisfying specific needs through the design of a family of common products.

9.1 Structure of thesis

The thesis is bound in two volumes and written in four sections with accompanying appendices:

Volume 1

SECTION ONE - Research to establish the context of case study

SECTION TWO - Design research to illuminate case study

Volume 2

SECTION THREE - Testing the product with product users

SECTION FOUR - Project evaluations & conclusions

APPENDICES

SECTION ONE - Research to establish the context of the case study, volume 1. Chapter 9.5, is the background of understanding from which the case study has emerged. Without this series of connections the case study could not have been generated. Contextual research covers: disability related products and how they relate to the user, design research and a contemporary view of disability.

SECTION TWO - Design research to illuminate the case study, volume 1. Chapters 10, 11 & 12 contain the specific information necessary to design seating for young adults with arthritis - an identified need for seating that appeals to younger people and takes into consideration the broad psychological, aesthetic needs and desires of individual users.
Secondary research includes information on arthritis, seating, seating recommendations, visual references of domestic seating, contract/office seating,

interior finishes and a sample of currently marketed disability products (technically these images should be footnoted, as any text used as a reference would be, but this was not practical). Primary research involved a survey of the sort of seating that younger people with arthritis have, need and desire. A series of statistical analyses were carried out on the data collated.

The design process involved the definition of the design brief, collation of the information necessary to solve design problems and development of a seat, footrest & cabinet from initial drawings to full sized prototypes.

SECTION THREE - Testing the product with product users, volume 2.
Chapter 13 documents prototype testing with product users. This process is carried out in a series of stages around an ethically vetted programme. The methodology, protocol and results are explained. The results are presented as footnoted interview highlights grouped into salient topics, these are made by prototype testing participants and an ergonomist Professor Mark Porter. The prototype designs where evaluated using this feedback, also indicating areas for further development.

SECTION FOUR - Project evaluations & conclusions, volume 2.
Case study conclusions make up the first part of Chapter 14, specifically evaluating design features of the prototypes and then the testing process. The thesis ends by responding to the six postulates that directed the project.

Recommendations for future work can be found in the **Appendices,** volume 2, section 13 called **Project overview - culmination of knowledge**

APPENDICES, volume 2
The second volume largely comprises of the Appendices and contains lists of references, bibliographies and contacts, postal survey questionnaires, statistical analyses, testing programme outline, results, transcripts, transcript highlights from design meetings and testing interviews. Also noted are design research anecdotes concerning the collation and documentation of secondary research, experiences of user testing, retaining the original nature of the views expressed and the limitations of

a project. Chapter 13 includes directions for future projects, taking the project further, developing the methodology, looking at different markets.

9.2 Style of the thesis

The contextual research has made reference to many secondary sources in order to draw ideas together and present a narrative through the thesis. This has been achieved by using footnotes, giving credit to the author and details of the citation.

Primary research generated interview results and transcripts. (Maykut & Morehouse, 1994)[12] It was essential to find a method of formatting this information to make reflection and reference possible. Again footnoting was used, enabling the presentation of accessible and detailed information.

9.3 Postulates

The project has been influenced by qualitative research methodologies and an understanding of a phenomenological approach. (Maykut & Morehouse, 1994)[13]

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[12] '...using the subjects' words better reflect the postulates of the qualitative paradigm. The qualitative research looks to understand a situation as it is constructed by the participants. The qualitative research attempts to capture what people say and do, that is, how people interpret the world.'
Maykut, P. & Morehouse, P. (1994) Beginning Qualitative Research, A Philosophic & Practical Guide, The Falmer Press, London & Washington D.C., p18

[13] 'Qualitative research values context sensitivity, that is, understanding a phenomena in all its complexity and within a particular situation and environment. The quantitative research works to eliminate all of the unique aspects of the environment in order to apply the results of the largest possible number of subjects and experiments.'

'...salient propositions. Discovery of proposition by observation and the careful inspection of the patterns which emerge from the data are the hallmark of the phenomenological approach.' p13

'The dominant paradigm, or the positivist position, sees the world as simple or at least potentially simple if it can be examined properly and broken apart correctly. In direct contrast, the phenomenological approach sees the world as complex and interconnected,

Assumptions, used as stepping stones to move to a position of understanding are defined as postulates:

> 'A postulate specifically, is something that is stipulated, that is, something given the status of acceptance in order to get on with the task in hand. The value of a postulate to restate is that it provides the bedrock on which to conduct research.' (Ibid.)

Below are assumptions that were explored throughout the thesis. They are listed in chronological order, in some instances one gave rise to the next.

9.3.1 Postulate (1) - disability product's function & aesthetics

Disability products appeared to have an uneasy aesthetic. This has been reiterated in comments made by design critics and people with impairments who use the products. To the extent that, products are often discarded, become an object of anxiety and the original problem remains. This phenomena is a result of the product's functional requirements being considered out of context of the user's needs, compromising the enjoyment and satisfaction of the product.

9.3.2 Postulate (2) - design & disability mission statement

Disability products can be designed to suit disabled people:

> Products can be designed which physically disabled people can make full use of and that they do not need to make adaptations in order to use them. The user should not have to compensate for inappropriate design, so saving time, energy and effort. Products can be desirable and provide sufficient choice to

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thus research must maintain the complexity if the explanation is to be trustworthy. Next, the dominant paradigm's approach to research sees information organised in hierarchies, that is, something is always at the bottom (subordinate) and something is already at the top (super ordinate). The phenomenological position on research sees information organised in heterarchies - a web of meaning is a good metaphor for heterarchial organisation of information.' p14

Maykut, P. & Morehouse, P. (1994) Beginning Qualitative Research, A Philosophic & Practical Guide, The Falmer Press, London & Washington D.C., p13- 14

reflect the user's taste. Products can be designed for the consumer disability market.

9.3.3 Postulate (3) - seating needs of younger people

The needs of younger and older people with arthritis are considerably different:

- older people spend more of their day wanting to snooze and much of the design emphasis would be concentrated on assisting people in and out of their chair.
- younger people spend more of their day awake and need provisions made for their seated activities and need less assistance in rising and lowering onto their chair.
- the interrelationship of the sitter, chair, accessory furniture and activities done whilst seated will be the main area for development.
- younger people want a more bold and contemporary aesthetics, allowing for free and creative product identity.

9.3.4 Postulate (4) - justifications to proceed with case study & prototype

- There is a need for seating which meets the outstanding functional requirements of people with arthritis and to be acceptable in the home.

- A seat which promotes a good posture can be restful. By supporting painful joints a domestic seat can be used as part of a pain reduction regime and can avoid contributing to further joint damage. Comfort can be synonymous with easing pain

- Creatively designed seating and accessory furniture offers choice and a sense of control by making provisions for seated activities as well as providing a place to rest.

9.3.5 Postulate (5) - seating designing brief

Postulates underpinned the design development process, in design these are known as the design brief:

- Products, that cater for a wide range of physical ability, can satisfy functional requirements and be acceptable and appropriate to the user;
- Products can be designed in response to observations of human behaviour, habit, posture, need and desire;
- By involving a sample group of users with a broad range of abilities in the design process the product is more likely to accommodate a larger percentage of the population;
- A flexible design approach can accommodate different experiences and types of mobility;
- An understanding of different types of mobility can inform the design of seating;

9.3.6 Postulate (6) - product satisfaction achieved by working with the user

Product satisfaction depends on the relevance of the information gathered and then how it is interpreted and developed into a design. Through close participation with product users it is possible to design to include individuality, rather than a constituency defined by their impairments. This could be the difference between the product being used or not used, or more recently purchased or not purchased.

User involvement, is the best way to acceptable and appropriate products.

9.4 What the project is not

The project is not a definitive guide to the medical aspects of arthritis, or an in depth thesis on the political or sociological issues in disability studies. Although necessarily touching on both.

The design work does not 'stand-alone' as products ready to be manufactured. They represent the first generation to a range of products.

SECTION ONE - Research to establish the context of case study

9.5 Introduction to SECTION ONE

Chapter 10, is the background of understanding from which the case study has emerged. It includes: disability related products and how they relate to the user, design research and a contemporary view of disability.

9.6 Categorising disability related products

There are different types of disability related products: in this project they are interpreted as those which address the consequence of physical impairment.

They can be seen as a spectrum from clinical, therapeutic, aids for daily living to universal design. They could be ranked according to the level of dependence upon each product type, the number of people each product would be suitable for and the size of the markets.

9.6.1 Clinical products

Clinical products have stringent medical specifications to be met and the consequence of a product failing could be critical. They are likely to be prescribed and administered by a medical professional and therefore demand for these types of products is likely to be relatively small. (These are products outside the boundaries of this project)

9.6.2 Therapeutic products

Therapeutic products[14] are viewed as equipment which could be used in clinics by paramedics or at home by individuals. Focusing on specific medical needs of a person and are often used in programmes of rehabilitation treatment following an injury or illness, or as a preventative means, i.e. for joint protection. It is possible that

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[14] 'relating to healing, or the art of healing; medical'
Macmillan, (1911) A Modern Dictionary, second edition

equipment might be suitable for treating a range of medical conditions so the market has the potential to be larger than that of clinical products.

9.6.3 Universal products

Universal products are the least specific of the spectrum, attempting to address the widest user group, thus the largest market. Hannah, (1992)[15] and Ward & Rogers, et al. (1996)[16] perceive 'technical difficulties' with the concept and a 'reluctance of product manufacturers to make the necessary investment.'

This philosophy of 'people oriented design' (Moore, 1982) has been given different definitions. The Design Museum (1992) calls this concept 'inclusivity' which suggests there will be no discrimination regardless of ability or age, whilst an approach which is applicable to all age groups is called 'Transgenerational' Design.

Domestic Universal Products can be compared with daily living aids in that they have been developed in response to certain activities, but rather than adapting existing products that are not ergonomic, new criteria are applied to widen the user range. Johnston & Barber (1996)[17] advocate 'blurring the dividing line... between products for the able-bodied and disabled people.'

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[15] 'Universal design is one of a number of design methodologies. It permits you to think about how to incorporate the needs of many, many different kinds of people.'
Hannah, B. (1992) Metropolis (USA), Universal design: Access to daily living, Nov., 12, no.4, p39-54

[16] 'The universal design approach whilst pleasing in concept, has proven difficult to implement in practice, due both to the considerable technical difficulties involved in successful design and the reluctance of product manufacturers to make the necessary investment.'
Ward, J., Rogers, N. et al. (1996) Journal of Rehabilitation Sciences, Techniques for the measurement of the human body and its actions: applicable to design for physically disabled people, issue 9, no.2., p34

[17] 'The challenge, perhaps, is for designers to retain the essential functions such equipment provides, but to get rid of negative associations by blurring the dividing line, where ever possible, between products for the able-bodied and disabled people.'
Johnston, M. & Barber, J. (1996) Design, Ordinary People, Spring 1996, p14

Ergonomic improvements to a product could be made by utilising the body's more comfortable neutral positions and by making use of the optimum strength achievable in any action and the relevant mechanical advantages in the body.

In some instances it is more appropriate to reduce the interaction with a process or product to a minimum, i.e. instead of using a conventional kettle to boil water, a wall mounted water heater could achieve the same end result.

Faste (1977)[18] comments from a design perspective that 'despite the great number of diseases and chronic conditions, there is a manageable number of dysfunctions which result from them'. Torrens (1994)[19] reiterates this view, by regarding the difficulties arising from tasks as being the focus to provide 'generic solutions' thus widening the market. Torrens, Marshall et al., (1996)[20], put into practice this concept in a project

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[18] Faste, R.A. (1977) 'New System Propels Design for the Handicapped', Industrial Design, July

[19] 'If common aspects of difficulties of task performance can be identified, generic solutions may be found to overcome parts of an individual's impairments that will also help other individuals with different impairments. The implications of identifying generic solutions to the design and manufacturer are that a larger market can be identified, more economic manufacturing processes used, and investment in research and development might be more possible.' p4
Torrens, G. (1994) Proceedings: A discussion of research and development methods through to a commercial conclusion, Conference of the European Academy of design, Designing for physical disability, 17.2.94, University of Salford, p4

[20] 'To make it feasible to buy batch quantities of components direct from the manufacturer the consumer market had to be enlarged. This was done through categorisation of the physical dysfunction clinically diagnosed in other forms of disability. Larger groups of people with different forms of disability were identified that had similar characteristic dysfunction's such as: weak grip, limited ability to lift the upper arm, an inability to hold objects, limited movement of the joints of the upper limb.' p802

to design an electronically controlled arm. 'Dysfunctions' are identified, often into common groups regardless of the cause, design intervention can be proposed.

9.6.4 Disability products

The following series of definitions or descriptions refer to the products I would generically call disability products:

- Assistive technology '...regards the environment in which a person operates, together with a person's functional abilities as invariant quantities and seeks to bridge the gaps between ability and environment demand by providing tools and assistive devices as appropriate.' (Ward & Rogers et al., 1996)[21]

- 'Rehabilitation and Assistive Technology (RT/AT) products lie between mainstream consumer and medical products.' (Torrens & Marshall et al., 1996)[22]

Torrens, G., Marshall, R. et al. (1996) Irish Manufacturing Committee Annual Conference, Using Modularity to Produce more Competitive Assistive Technology Products, University of Limerick.

[21] 'The assistive technology approach regards the environment in which a person operates, together with a person's functional abilities as invariant quantities and seeks to bridge the gaps between ability and environment demand by providing tools and assistive devices as appropriate.'
Ward, J., Rogers, N. et al. (1996) Journal of Rehabilitation Sciences, Techniques for the measurement of the human body and its actions: applicable to design for physically disabled people, issue 9, no.2. p34

[22] 'Rehabilitation and Assistive Technology (RT/AT) products lie between mainstream consumer and medical products.'
Torrens, G. & Marshall, R. et al. (1996) Irish Manufacturing Committee Annual Conference, Using Modularity to Produce more Competitive Assistive Technology Products, University of Limerick, p797

- 'Aids to daily living' are 'small easily handled tools...' and 'equipment describes larger items'. They are used to '...do something that he *(or she)* wants to do and which would be impossible without the aid.' (Cochrane, 1983)[23]

- Daily living products are aids for everyday activities, by adapting equipment within the domestic environment or by providing additional 'tools' which 'increase our possibilities or our efficiency.' (Brochmann, 1970) These are products that deal with kitchen tasks, seating, bathing and toileting for people who have general physical difficulties.

A recent consultation document referred to such a product, or service which bridges a gap, as an 'auxiliary aid or service'. (NDD, 1998)[24]

In the past they have been provided and recommended mainly by Occupational Therapists but recently it has been recognised as a growth market currently quoted as being worth £3bn possibly growing to £5bn by the turn of the century (Ashcroft, 1998)[25]. Boots have produced a catalogue, Keep Able, a specialised aids superstore,

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[23] Definition of an Aids & Equipment:
'Aids to daily living equipment include small easily handled tools...'
'Equipment describes larger items that are not easily portable...'
'For an aid to be successful it must follow the user to do something that he *(or she)* wants to do and which would be impossible without the aid.'
Cochrane, G.M. (1983) Hospital at Home, Aids in the Home, British Journal of Hospital Medicine, Feb., p121-6

[24] '6.26 ...An auxiliary aid or service might be the provision of a special piece of equipment or simply some extra assistance to disabled customers, clients or service users. In some cases a technological solution might be available.'
National Disability Council, Department for Education & Employment (1998) Proposals for a Code of Practice: Rights of Access, Goods, Facilities & Premises

[25] 'Information available to encourage attendance and media coverage of the show (Independent Living Show) stated the disability market in the UK to be worth £3bn....the already substantial disability market of around £3bn is clearly set to rise rapidly and could well reach £5bn by the millennium.'
Ashcroft, J. (1998) Arthritis News, As I See it..., no. 81, Dec-Jan 1998-9, p8

has several regional branches and mail-order businesses are thriving. The market was promoted by the former Parliamentary Under Secretary of State, (Yeo, 1992)[26]

9.7 A background to disability products

Social services departments have been obliged to provide relevant support to people with disabilities for the last twenty years or more. (Hollings & Haworth, 1978)[27] & (Cochrane, 1983)[28] Disability products can be obtained by various different arrangements of renting and purchasing through social services, (Ibid.)[29] & (Hollings & Haworth, 1978)[30] but it is increasingly possible to purchase products independent

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[26] 'Many people's quality of life can improve substantially with the help of quite simple equipment that restores independence, dignity and confidence.'
Yeo, T., (1992) Equipped for independence: Meeting the Needs of Disabled People, Department of Health, Parliamentary Under Secretary of State,

[27] 'The introduction of the Chronically Sick and Disabled Persons Act (1970), placed an obligation on social services departments to identify the disabled people in their communities and to supply them with appropriate services, equipment and aids.'
Hollings, E.M. & Haworth, R.J. (1978) Supply and Use of Aids and Appliances, Occupational Therapy, Oct., p336

[28] Need for Provision of Aids: 'Reinforced advice came in later circulars (D.H.S.S., 1971a, 1971b): 'There is need for greater provision of simple personal aids and domestic equipment for the disabled, together with careful and continuing instruction in their use and in many cases the dwellings of disabled people need special adaptions to make them more convenient and to enable them to be used more fully.'
Cochrane, G.M. (1983) Hospital at Home, Aids in the Home, British Journal of Hospital Medicine, Feb., p121-6

[29] Financing Aids and Equipment:
'The methods of financing aids and adaptions vary between local authorities; some sell aids to clients at cost price, most supply aids free and on loan irrespective of the cost, and a few apply means testing (which is usually costly in administration). The practice of making small hiring charges has been discontinued.'
Cochrane, G.M. (1983) Hospital at Home, Aids in the Home, British Journal of Hospital Medicine, Feb., p121-6

[30] Source of Aids:

of the social services, finances permitting. There are advantages and disadvantages in both situations.

9.7.1 Care in the Community: Direct Payment Scheme

In some regional areas the Community Care Act: Direct Payment Schemes, has been implemented in April 1997. (Hermeston & Gregory, 1997)[31] This enables a disabled person to determine his or her own care arrangements. Self-help and support groups have been formed to advise those unused to employing Personal Assistants, to purchase their products and discuss related issues.

Although not all councils have implemented this scheme yet there has been much positive feedback on the sense of autonomy felt by disabled people. This can only improve the range and quality of goods that meet the needs of the wider spectrum of abilities. True consumer demand could come about, rather than a false market engendered by the Social Services or Care Home Owners who purchase products on behalf of users.

'b) Supply of aids: The number of aids and appliances recorded at the home visit one year after discharge (from the Rheumatology unit of not less that two weeks admittance) and the source of supply are shown in fig.1.

The patients themselves provided over half the house adaptions (52%) and almost half the beds (46%) and tables (43%). Community occupational therapists arranged for the provision of ... approx. half the chairs and table (52%)..'

Hollings, E.M. & Haworth, R. J. (1978) Supply and Use of Aids and Appliances, Occupational Therapy, Oct., p336-9

[31] 'Ms Campbell (Jane Campbell BCODP) hopes that agencies will be forced to provide better service on the Community Care (Direct Payments) Act comes into effect in April. This will give local authorities discretion to allow disabled people under 65 the right to buy their own care directly.' Hermeston, R. & Gregory, H. (1997) Disability Now, Paying the Price of Caring, Jan., p12

9.7.2 Product purchaser may not be product user

The market for disability products is an interesting one because in many cases the producer's customer is not the end user. (Torrens, Marshall et al., 1996)[32] The intermediary is frequently Social Services who influence the supply, demand and retail price of disability products. Economic decisions influence the products leaving them 'lacking adventure'. (Johnston & Barber, 1996)[33]

If the user is not the purchaser then, owing to cost restraints, the possible consequences are that their needs are not completely met (Poole, 1997)[34] and almost certainly choice will be limited. (Johnston, 1998)[35]

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[32] 'Many RT/AT products are bought by a third party, such as an Occupational Therapist or a carer.'
Torrens, G. & Marshall, R. et al. (1996) Irish Manufacturing Committee Annual Conference, Using Modularity to Produce more Competitive Assistive Technology Products, University of Limerick, p798

[33] 'But one of the reasons why products for disabled people have lacked adventure is that the main consumers have always been the medical organisations - the NHS. the social services and the Department of Employment. Inevitable, the emphasis has been on keeping the price for the user as low as possible.'
Johnston, M. & Barber, J. (1996) Design, Ordinary People, Spring 1996, p15

[34] During a visit to Naidex, 15.5.97, at the NEC in Birmingham, I spoke with a seating salesman. I asked if there were any raiser/recliners chairs with a lumbar support. He said 'No, if you mess about with the chairs like that, then it puts the price up and then the Social Services can't afford to buy them.' Although an off-the-cuff-remark, there is the concern that in order to reduce the price the product would not necessarily meet the sitters' needs.
Wondered out-loud if Social Services had seating budgets any more, he said they did, 'It just depended on policy and whether the OT liked the product, because they are the people that buy them'. Another concern would be that the person who would eventually accommodate the design is not the one who chose the chair.

[35] 'Many disabled people rely on special aids to carry out everyday tasks,' said Malcolm Johnston, director of Design for Ability Research. 'These products are presently manufactured and prescribed according to medical need with scant consideration for the lifestyle and aspirations of the end user. With little choice of aids and a lack of

Stevens and Gabbay (1991)[36] suggest that the true demand for equipment and services is distorted. The demands established for certain equipment or services are unlikely to have been created through genuinely made informed decisions by the users. Intervening 'powerful others' will have other agendas, i.e. cost and availability, which have to be met, behind each 'appropriate' solution found.

9.7.3 Consumerism and the disability market

Waterhouse (1987)[37], observing the disability market as exhibited at the Northern Naidex, a national exhibition of disability products, enthused about the potential for increased choice that consumerism will offer.

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accessories, colours and styles, disabled people have few opportunities to express their individuality.'

'Valuable resources are being wasted on inappropriate, poorly design equipment that is unattractive to, and therefore under-used, by the client,' added Mr Johnston. 'Disabled people want attractive aids that don't draw attention to their disability.'
Anon. (1998) Arthritis Care, Disability Aids Can be Cool, Vol.77.,4.5.98, p3

[36] '...What people ask for (Or in a market place, are prepared to pay for) or what their health professional prompts them to ask for.

(Demand is subject to influence from) ...social and educational backgrounds, and the medical professions.'

(Supply) '...What is provided, has been shaped by various pressures from the public, politicians or medical power politics.'
Stevens & Gabbay (1991) *in* Chamberlain, M.A. et al. (1993) An Assessment of Health and Related Needs of Physically Handicapped Young Adults.

[37] "And consumerism has even caught on, helped by grants and loans... As expectations increase along with competition the next generation of products will bring designers into the innovation process... improved ergonomics and easier machine tooling will be reflected by the price structure which further widens the options."
Waterhouse, R. (1987) Design, A Mobile Promise, a review of the Northern Naidex, 464, Aug. 87, p47

Anticipated competition is seen as having the potential to steer the market towards improved choice and quality of products. Hypothetically, by having the opportunity to

'select and purchase a product from a range of products and in doing so is able to bring an influence to bear on the market where goods are manufactured and sold.' (Montgomery-Ward *in* Godwin, 1987)[38]

Beyond the 'get what you're given' culture of the Social Services, the option to buy or not and from which range is an ideal yet to be realised in the disability market. So selective purchasing to boycott certain products is not a realistic option because of the market's limited choice.

Sceptical of the Conservative myth of an empowered consumer, Whiteley (1993) comments: 'Consumerism is upheld by the Right as the mechanism which gives power to the consumer'. 'What masquerades as consumer choice is ...more likely to be 'producer choice''.

The changes affecting the manufacture of disability products are as yet to be owed to users' preferences. It will be some time before the consumer market forces truly affect the sales of poorly designed artefacts, and update designs.

9.7.4 Manufacturing disability products

Martin (1987)[39] stresses that companies 'producing aids for disabled people' must be able to make a profit.

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[38] 'In the political economic sense being a consumer implies more than just being a user of goods, but also one who is able to select and purchase a product from a range of products and in doing so is able to bring an influence to bear on the market where goods are manufactured and sold.'
Montgomery-Ward mail-order catalogue p204 *in* Godwin, M. (1987) Design for Disability in Britain 1945-87: as Study of Cultural identity of aids for the Disabled RCA Dissertation

The financial implications of small markets could be addressed by selling the high specification disability products internationally. Advances in communications technology could be used to reach many minority markets and increase commercial viability: '...RFSU-Rehab is Sweden's largest manufacturer and distributor in this field, with exports accounting for 39% of total sales.' (Hoyna, 1989)[40]

Charities invest in purchasing equipment for their members. But some 'disease related' charities, for example MNDA (Motor Neurone Disease Association), also fund the development of new equipment. (Torrens, 1994)[41]

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[39] 'The cost of development, materials, premises, advertising and a sales force (with a profit margin for the manufacturer and royalties for the inventor), must all be weighed up against the potential profits from a limited market... And because it is expensive to produce limited numbers of an item, the cost to the disabled customer is also high. The hardest thing about producing aids for disabled people is finding buyers who can afford the product no matter how much the need is.'
(Martin, S. Managing Director of Elfin systems, which makes innovative electronic aids for disabled people.) *in* Wingate, K. (1987) Disability Now, March, p6

[40] 'Today RFSU-Rehab is Sweden's largest manufacturer and distributor in this field, with exports accounting for 39% of total sales.'
Hoyna, U. (1989) Form, Not visibly disabled, vol. 85, no.663, 7, p102

[41] '...In any disease related charity the majority of funding is directed towards medical research to find a cure. The MNDA (Motor Neurone Disease Association) has recognised that, as well as working towards the future elimination of the condition, its members required support now and so the Association actively facilitates the provision of care and supply of equipment. The 1994 accounts of the MNDA include approximately £328,000 for medical research and £250,000 for equipment and its members, plus £40,000 provision for new equipment research and development.' p2
Torrens, G. (1994) Proceedings : A discussion of research and development methods through to a commercial conclusion, Conference of the European Academy of design, Designing for physical disability, December 17, 1994, University of Salford, p2

9.7.5 Desire for independence in the disability product market

Historically there has been an emphasis on the social services' assessments and charity contributions dictating the supply of equipment to the client. Stowe & Chamberlain, (1980)[42] identified a strong desire for independence through purchasing an aid. This would suggest that the person becomes a customer rather than a client and is consequently empowered to join in our consumer society. A survey, carried out by Central St. Martin's College, showed that such is the strength of feeling that product users would pay 'up to 75% more for better design.' (Johnston & Barber, 1996)[43]

9.7.6 Accepting and using disability products

Disability products used effectively can make life easier and more comfortable for people with impairments. (Holroyd, 1992)[44]

Environments and the objects within them have a psychological effect on people: 'Form, colour, light have an actual physical effect.' At a seminar at the Chartered

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[42] Buy own equipment:
'A great need is obviously apparent for people to be able to purchase their own aids, as independence strikes a strong note. Many felt that it is most important to own their aids rather than to have them on loan from services.'
Stowe, J. & Chamberlain, M.A. (1980) Aids for Arthritics British Journal of Occupational Therapy, March, p81

[43] '...Yet central Saint Martins' survey showed that many people are prepared to pay up to 75% more for better design.'
Johnston, M. & Barber, J. (1996) Design, Ordinary People, Spring 1996, p11-12

[44] Organisation in order to be in control in your home:
'Home really should be the one place you feel you have some control over life with the arthritis, an 'enabling', not a disabling place.'

'Make at least one room, or corner of the house, exclusively yours; a place where you can relax, where everything's in reach, and where you can be quiet and do you own thing.' Holroyd, J. (1992) Arthritis at Your Age?, Suffolk: Grindle Press, p157

Society of Designers, Peter Barefoot[45] explained how careful consideration should be given to materials, colour, domestic familiarity, patterns, graphics and cognitive plans.

Gater & Feeney (1975)[46] proved the importance of considering the psychological factors involved with the design of an alarm for people with restricted ability, particularly elderly people.

Some potential product users make elaborate efforts to avoid using disability products, not because they are impractical but undesirable. (Johnston & Barber, 1996)[47] (Poole, 1997)[48]

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[45] Barefoot, P. (1993) D.I.A., from a report: Acute mental illness ward mentioned at a seminar at the Chartered Society of Designers, Bedford Square, London

[46] Psychological Factors of Using Aids:

'The investigation of the psychological factors was carried out by personal interview in the homes of 120 elderly people who had been issued alarms system...

... Analysis of the data revealed a number of important effects of alarms systems. These were:

(1) Having an alarm system was an indication to the elderly person that they were impaired and likely to be involved in an emergency.

(2) Having an alarm altered their status to one of dependence.

(3) Having an alarm system caused the elderly person to worry that the alarm system would attract undesirable attention.

(4) False alarms which occurred frequently with some alarm system caused street to the elderly person and their neighbours...'

'This would indicate that psychological factors must be investigated when evaluating or designing equipment for use by the elderly and disabled.'

Gater, M.D. & Feeney, R.J. et al. (1975) The Need to Consider Psychological Factors in the Evaluation of Equipment for the Elderly and Disabled - the Application of Psychology to a practical Problem, Bulletin of British Psychological Society, vol. 28, p231-1

[47] 'Our researchers, discovered deep unhappiness with the equipment that is currently available. One woman said she would rather put herself through the daily discomfort of standing out of her wheelchair to reach high cupboards, than have her kitchen transformed into one that is obviously for disabled people.'

Expressions of anger and resentment towards the designed solutions for disabilities are powerfully voiced in poetry. French, (1994)[49] expresses a cynicism towards disability products and Makayute (1994)[50], a resentment of 'state of the art disability products'.

Johnston, M. & Barber, J. (1996) Design, Ordinary People, Spring 1996, p14

[48] 'Overall it was found that people could make use of the mock-up and carry out the tasks safely and steadily, reaching and handling food preparation. But people commented that although it might make things easier, it would make them feel lazy.

The issue was far more complex than I had realised. Its not just an issue of function and practicability. People's personalities are far more complex, they come between practical solutions and the user. The design must cater for people's tastes, desires and habits.'
Poole, L. (1997) Lecture to Design students, Bournemouth University, 24.11.97

[49] 'the advantages of technological solutions *(products to avoid disabling situations)* to non-disabled people are that they look more impressive, usually cost less and don't interfere with their lives...'
French, S. (1994) 'Equal Opportunities... Yes, Please' in Keith, L. (1994) Mustn't Grumble, London: The Women's Press, p154

[50]'And they say *'dreamer' like it was a dirty word*
and they say *'how dare she say such a thing*
how dare she say she wants to walk
again how dare she'd prefer
to run free, to feel her vagina again,
how dare she voice that
after all we've done to make
disability a state in which to be proud?...
...I say that
and I love myself
in this moment
without condition.'
Makayute, J. (1994) 'Freedom Fighter' *in* Keith, L (1994) Mustn't Grumble, London: The Women's Press, p187

9.8 Aesthetics & functionality of disability products - postulate (1)

Disability products appeared to have an uneasy aesthetic. This has been reiterated in comments made by design critics and people with impairments who use the products. To the point that, products are often discarded, become an object of anxiety and the original problem remains. This phenomena is a result of the product's functional requirements being considered out of context of the user's needs, compromising the enjoyment and satisfaction of the product.

9.9 Why do disability products look the way they do?

Functionality appears to have been considered the only criterion for many disability products. Their appearance seem to reflect theories of the Modern Movement: embracing advancements in manufacturing technology, without decoration, relying on a 'truth to materials', and accepting a 'machine aesthetic'. Brochmann (1970)[51] defines the beauty of an object as 'distinguished by fitness for its purpose... Apart from decorations and pure objet d'art the rest of our belongings serve some practical purpose..., increase our possibilities or our efficiency.'

From a Modernist perspective, a product without ornament was not expected to appear base, indeed, beauty was intended to 'spring directly, and preferably to an increased degree, from the function - determined form.' (Mollerup, 1986)[52]

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[51] Brochmann, O. (1970) Good and Bad Design chpt. 7, Van Nostrand Reinhold

[52] 'The functionalists' departure from ornament was not intended as a farewell to beauty. It was supposed to spring directly, and preferably to an increased degree, from the function - determined form. It was by no means a novel idea. Plato, some 2000 years earlier, had been on to something similar: *When evaluating the quality and beauty of an object on should always have its function in mind.*

That the beauty of an appliance follows from its function can be understood in two ways: *Either* that the functional is a necessary *and* sufficient condition for beauty, *or* that the functional is a necessary but *insufficient* condition for beauty.' Mollerup, P. (1986) Design for Life, Danish Design Council

One explanation for the particular aesthetic of disability products is that they are thought of solely as tools, i.e. an extension or an improved part of the user: a longer arm, a stronger hand. Their appearance has been formed by purely utilitarian considerations. Following through this analogy, Brochmann (1970)[53] could describe an axe explaining how it emanates an inherent beauty.

The material quality, proportion and associated efficiency of an axe are examples of abstract theory applied to artefacts. Mollerup (1986) points out that it is a philosophy that dates back to Plato: 'When evaluating the quality and beauty of an object one should always have its function in mind'. By bestowing notions of beauty upon utilitarian products, theorists and promoters may have helped to bring about an acceptance of the aesthetic of mass produced artefacts developed against strict economic limitations (Baynes, 1967)[54], but these sorts of definitions of beauty are unlikely to be commonly held by a lay person.

If the Modern Movement has contributed to the ethos behind the design of disability products, perhaps it is worth considering who has done the designing. According to Johnston & Barber (1996)[55] these products are still 'dominated by their engineering heritage'. There is a charitable organisation which is mainly populated with retired engineers whom volunteer to manufacture equipment for disabled people in their community. Much of the material is of a 'found' nature and many of the aids are

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[53] 'The beauty of the axe is that it is all governed by law: the relation of the length of haft to size and weight of blade, the interaction of its two materials, wood and steel - all seen against the background of people's experience of its efficiency... everything that deserves to be called beautiful... must be distinguished by fitness for its purpose.'
Brochmann, O. (1970) Good and Bad Design, chpt. 7, Van Nostrand Reinhold

[54] 'Economics determine the designer's freedom of action at each point and, in a greater or lesser degree, have partly determined the character of men's artefacts all though history.' Baynes, K. (1967) Industrial Design and the Community, London: Lund Humphries, p26

[55] 'But hoists and lifts used by disabled people are still dominated by their engineering heritage'
Johnston, M. & Barber, J. (1996) Design, Ordinary People, Spring 1996, p12

made at home. This remedial work undoubtedly solves 'one-off' practical problems and also provides fulfilment for the maker. This arrangement is most satisfactory for those who enjoy a 'home-made' quality of product, and would not feel beholden for the good deeds of others. It is not sustainable on a large scale.

From my understanding, the difference between product design and engineering is not only the subject matter, but the approach of the designer or engineer. (Figure 1)

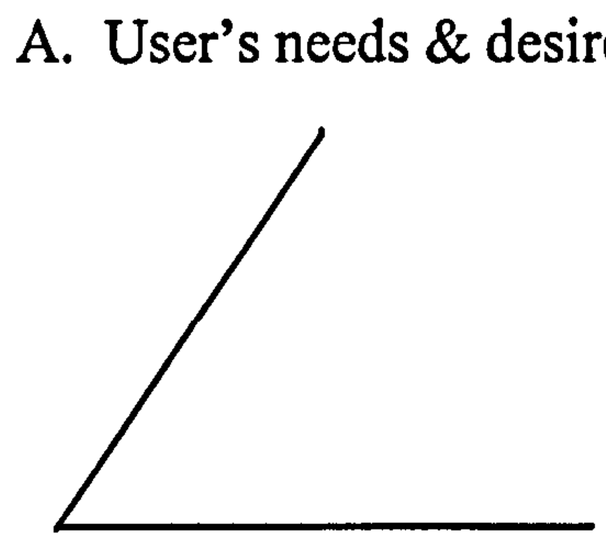

Figure 1 Division of interest in the design process

Different results will be achieved depending on the whether a designer or engineer begins from A, B, or C.

9.9.1 There is more to the acceptance of a disability product than function

If one of the elements in the design process is considered to the exclusion of others then the outcome is likely to seem out of balance. An example of this is the British Invalid Tricycle, which was criticised by the Design Museum (1992)[56] for being 'ugly and purely functional, which made them (people with disabilities) stand out as being different.' Considering the mechanism for meeting a need out of the context of use and the user, produced a stigmatising design.

If the mass market was satisfied with form solely as an expression of function, then a wheelchair would be one of the highest and most enviable mainstream possessions. Since this is not the case, there must be other criteria to a successful product besides function.

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[56] 'One of the most notorious designs of the disabled was the British Invalid Tricycle... disabled people had to drive around in something ugly and purely functional, which made them stand out as being different. What they wanted was something which met their needs but looked like a normal car.'
Design Museum (1992) Designing, no.31, p15

9.9.2 How do we perceive products?

According to Brochmann, (1970)[57], fundamentally we are attracted to objects with a 'certain degree of uniqueness'. Our curiosity is 'sharpened by rarity (where it does not seem frightening)'. This is an important consideration for design solutions which might make people appear extraordinary. The reactions of others can range from intrigue to fear. Inversely, our keenness of perception is 'diminished by familiarity', so products that appear to be every-day are easily overlooked.

9.9.3 How should products be perceived?

A post modern, counter argument, although from a craft base, confirms that function does not necessarily give rise to form. (Pye, *in* Dormer, 1995)[58] Indeed, the aesthetics of a product are seen as 'part of the function of design.' (Dormer, 1995)[59] or 'encompassed by a design.' (Pye, *in* Dormer, 1995)[60]

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[57] 'We are attracted to a certain degree of uniqueness... our eye is extra receptive to impressions that are not ordinary, everyday ones, to things that are unusual... As soon as a thing can be seen here, there and more or less everywhere, it loses this attraction... as our ability to see is sharpened by rarity (where it does not seem frightening) it can be diminished by familiarity.' Brochmann, O. (1970) Good and Bad Design chpt. 7, Van Nostrand Reinhold

[58] '... no matter how hard you pinned down the definition of a particular function it would not yield to a specific form. The choice of the form remains to a greater - or lesser - extent in the hands of the designer.' Pye, D. *in* Dormer, P. (1995) Furniture Today, London: Crafts Council, p8

[59] 'form follows function': '...no theory, no tidy slogan can guarantee beauty.'
'...appearance and appeal being a part of the function of design.'
Dormer, P. (1995) Furniture Today, London: Crafts Council, p21

[60] 'We do not necessarily want function to play a major role in shaping the design (although we might) but, unless we are commissioning a work of art, we will want the function to be encompassed by a design.' Pye, D. *in* Dormer, P. (1995) Furniture Today, London: Crafts Council, p9

In 1990, Dormer[61] wrote '...post-modernist theory had pulled the rug out from under some of the older certainties.' Contemporary artefacts should 'express meaning'. Papanek (1995)[62] discusses his efforts to 'communicate associations of safety and comfort' in the design of a birthing-chair.

However, there is a cynical sense by which products 'must catch at our emotions' for their own sake, to secure a purchase and increase sales. (Dormer, 1990)[63] Powell (1995)[64], of Seymour Powell Designs, describes the component of a successful design

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[61] '...at this stage of the century, there is a pressing demand for objects and buildings to express meaning. Intellectually the demand for designers to think about the expression of meaning and the generation of metaphor in the work had some roots in the scepticism which underlies the wider post-modern debate. Individuals, including designers, need to have frameworks and justifications for what they are doing: post-modernist theory had pulled the rug out from under some of the older certainties.'
Dormer, P. (1990) The Meanings of Modern Design, London: Thames & Hudson, p103

[62] 'Ironically, I am presently designing a birthing-chair for a women's group, a design that is based on a reclining lounger developed by the Bauhaus. Let me emphasise quickly that I am adapting the Bauhaus original for ergonomic reasons only. Aesthetically the original is far from satisfying since the birthing-chair needs to communicate associations of safety and comfort- the sterile seeming cleanliness of the original did not carry these reassuring patterns.' p50
Papanek, V. (1995) The Green Imperative: Ecology & Ethics in design & Architecture, London: Thames & Hudson, p50

[63] '... more and more we find we can take the quality of production and even the sensible design of an object for granted. And as we do so, we find that designers and manufacturers search for new ways to make their products not merely attractive, but fanciful. In engaging our interests, 'they' (those who seek our money) are being persuaded by designer stylists that 'they' must catch at our emotions.'
Dormer, P. (1990) The Meanings of Modern Design, London: Thames & Hudson, p98

[64] 'As we began to develop as designers, we began to realise that something funny was going on. One would design something that worked well, looked good... yet certain things were working instantaneously with people, and certain things weren't.

This is like a bright light, this grail *(definition: goal)* at the centre of everything. How does... one engineer appeal? That thing that makes that one work and that one not. This 'X-factor'. That's what we get paid for here.'

composition, the element of aesthetic which appeals 'instantaneously' with people as the 'X-factor'. Seymour (1995)[65] uses 'balance' to define his notion of 'X factor'. Also a totality: 'you never know when you've got it right until the very last moment when all those bits come together'.

This 'X-factor' is a simple yet mysterious way to describe a fine motivating factor that attracts people to objects and more specifically customers to products: 'I want that, I like that, now what does it do? How much does it cost?... its that immediate... we want the product to leap off the shelf, we want it to appeal actually (sic) to most people.' (Powell, 1995)[66]

Seymour, R. (1995) Equinox, Designing Dream Machines, 10.12.95, Channel 4, (Transcript for video, written as spoken)

[65] Commenting on the prototype for the BSA Bantam bike:
'...its got the right balance of cute-'ness', to quality, ...its got that feeling of old fashioned-'ness' but its modern, and they're in the right balance and you never know when you've got it right until the very last moment when all those bits come together, and so to open those doors and see the thing and get the first burst. That's what the customer gets. That's what the customer gets (repeated) That first nanosecond. That's the 'X-factor'. Well I'm not exactly target market, but I've got enough of that inside me to say I think we're getting pretty close here.'
Seymour, R. (1995) Equinox, Designing Dream Machines, 10.12.95, Channel 4, (Transcript for video, written as spoken)

[66] '...This is our battleground (entering an electronic goods superstore) This is where money actually changes hands. This is where consumers get confronted with every conceivable kind of product...'
'...In my view at least, its a sea of mediocrity. There are some individual beautifully designed things, but there's this lack of identity/character... you know...'
'When the consumer goes out to buy something, they look - Bang! And they make a decision first of all on 'like the look of that'. Now that's what we call 'X-factor' - 'I want that, I like that, now what does it do? How much does it cost? And all those other factors. So its that immediate...kind of thing, we want the product to leap off the shelf, we want it to appeal actually (sic) to most people.'
Powell, R. (1995) Equinox, Designing Dream Machines, 10.12.95, Channel 4, (Transcript for video, written as spoken)

Having established that the appearance of a product is important as it carries an identity which will be associated with it and define the way it will be used, these ideas are now going to be explored in relation to disability products.

If these humanising details are not considered, the resultant product is 'functional but dull, taking little account of style or appearance.' There would be no satisfaction which is important in good design. (Design Museum, 1992)[67]

Waterhouse (1987)[68] underestimates the value of aesthetic detailing for disability products by remarking: 'there is no reason for surface gloss'. Perhaps 'gloss' is unnecessary, certainly 'New Technology, engineering and ergonomics have made things (products marketed to aid mobility and independent living) work better,' but the people who live with the way products look ought to be considered. (Johnston & Barber, 1996)[69]

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[67] 'In the past, products design or the disabled have tended to be functional but dull, taking little account of style or appearance. i.e. Gripping tools, designed by RFSU Rehab, Sweden, would undoubtedly help people with limited movement... (but) probably wouldn't make you feel good about using them.'
Design Museum (1992) Designing no. 31, p15

[68] 'Does the consumer pick a wheelchair, or a bath hoist, because he/she likes its look and feel, or because the model has a tried and tested safety record? In an area like disability products, where safety must come first, there is no reason for surface gloss... there's nothing to say that a stair lift should not look great as a well as do its job with absolute reliability. Its a classic case of fitness for purpose...'
Waterhouse, R. (1987) Design, A Mobile Promise - a review of the Northern Naidex, 464, Aug. 87, p47

[69] 'New Technology, engineering and ergonomics have made things (products marketed to aid mobility and independent living) work better, but little attention has been paid to the way they look.'
Johnston, M. & Barber, J. (1996) Design, Ordinary People, Spring 1996, p11-12

Sebastian Conran (1993)[70] criticises a design of some spoons for the designer's apparent lack of consideration for the user's 'self pride or (to) make it a stylish, beautiful object'. He describes their appearance as being in the 'vernacular of the hospital' with all the unpleasant associations of illness. Johnston (1996)[71], referring to a Zimmer frame, explains that dehumanising aesthetics can come about because all the attention is on the 'disability rather than the person.'

Wickman (1992)[72] upholds this view that people with disabilities are as entitled to aesthetic consideration as anyone else, they have a 'right to use beautifully and well designed tools.'

Meda (1994)[73] explains the need to humanise design, because 'the user tends to establish with the object a relationship that involves all the senses'. 'Besides carrying out their function they (the products) can convey meanings, not only through their

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[70] 'There's no attempt to consider one of those funny spoons in terms of its owner' self pride or make it a stylish, beautiful object... they are designed in the vernacular of the hospital. Hospitals are about illness and illness is unpleasant, so why are we giving people things that make them look s if they have just come out of a hospital ?'
Conran, S. (1993) of Product Identity Design in
Coleman, R. (ed.) (1993) Designing for Our Future Selves, RCA, p18

[71] 'It's an object (the zimmer frame) whose very form seems dehumanised and focused on the disability rather than the person.'
Johnston, M. & Barber, J. (1996) Design, Ordinary People, Spring 1996, p13

[72] 'Disabled people have the right to use beautifully and well designed tools.'
Wickman, K. (1992) Axis, To Care About Life, 45 p102

[73] 'I think that a project must shift its focus from languages to relations because the aesthetics of a thing is no longer only referred to the shape of its appearance, but its ties to its operating mode. Moreover the user tends to establish with the object a relationship that involves all the senses... Besides carrying out their function they (the product) can convey meanings, not only through their form, but through the aspects of emotive relationship that they establish with the user.'
Meda, A. (1994) How Design and Technology Interact, Domus, 761, June, p76-80

form, but through the aspects of emotive relationship that they establish with the user.'

Brochmann (1970) observes that 'our opinion of things is marked by our knowledge of them' so if disability products could appear 'friendly', and 'easily read' and the meanings they convey positive and not threatening by obscurity, then perhaps social barriers would be less defensive and discriminating. 'Disabled people want attractive aids that don't draw attention to their disability.' (Johnston, 1998)[74]

9.9.3.1 Disregard for psychological effects of design

The failure to consider the psychological effects of a design could have serious implications: 'Aids frequently look unpleasant medical and unaesthetic, although some patients like the invalid image and welcome this. Many more do not and refuse aids which could help them.' (Chamberlain et al., 1980). Disability products appearing unacceptable, inappropriate or undesirable are likely to be rejected.

It has been recognised that products can remain unused (Thornley, 1977).[75] There are a number of reasons for this, some are:

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[74] 'Many disabled people rely on special aids to carry out everyday tasks,' said Malcolm Johnston, director of *Design for Ability* Research. 'These products are presently manufactured and prescribed according to medical need with scant consideration for the lifestyle and aspirations of the end user. With little choice of aids and a lack of accessories, colours and styles, disabled people have few opportunities to express their individuality.'

'Valuable resources are being wasted on inappropriate, poorly design equipment that is unattractive to, and therefore under-used, by the client,' added Mr Johnston. 'Disabled people want attractive aids that don't draw attention to their disability.'
Anon. (1998) Arthritis Care, Disability Aids Can be Cool, Vol.77.,4.5.98, p3

[75] 'It is often suspected by those presenting and supplying aids that while many are a great help to patient other are rarely used.'
Thornley, G. et al. (1977) Evaluation of aids and Equipment for bath and toilet Occupational Therapy, Oct. p243-246 *in* Hollings, E.M. & Haworth, R.J. (1978) Supply and Use of Aids and Appliances, Occupational Therapy, Oct., p336-9

- psychological (Holroyd, 1992)[76]
- 'inappropriate, poorly designed equipment... unattractive' (Johnston, 1998)[77]
- associated with the manner in which the aids or equipment are acquired (Cochrane, 1983)[78]

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[76] Recommending Using Aids:

'The right gadget or piece of equipment or adaption can make a dramatic difference to keeping yourself as independent and sweet-tempered as possible, and can help you protect your joints and conserve your energy. It doesn't have to be expensive, or even 'specially for disabled people.''

'...Often the simplest and cheapest solution is the best, or maybe just a new way of doing something. Or even, as one young person with arthritis put it 'some things I just leave!''

'Some of us are too embarrassed to use special gadgets or adaptions; we feel we're making ourselves look 'odd' or 'different'.

'...one of the most important reasons why some one with inflammatory arthritis *should* use gadgets or adaptions (provided that they're used the right way) is to *avoid* joint damage or deformity, and to conserve energy for more essential or enjoyable activities. Maybe you *can* struggle to open a tin manually, but at what cost to your joints? An electric can opener (the right sort) could save the energy, pain *and* help avoid further joint distortion.'
Holroyd, J. (1992) Arthritis at Your Age?, Suffolk: Grindle Press, p141

[77] 'Many disabled people rely on special aids to carry out everyday tasks,' said Malcolm Johnston, director of Design for Ability Research. 'These products are presently manufactured and prescribed according to medical need with scant consideration for the lifestyle and aspirations of the end user. With little choice of aids and a lack of accessories, colours and styles, disabled people have few opportunities to express their individuality.'

'Valuable resources are being wasted on inappropriate, poorly designed equipment that is unattractive to, and therefore under-used, by the client,' added Mr Johnston. 'Disabled people want attractive aids that don't draw attention to their disability.'
Anon. (1998) Arthritis Care, Disability Aids Can be Cool, Vol.77,4.5.98, p3

[78] Accurate Prescription:

'Accurate Prescription rests on careful assessment: different people have different problems.'

- whether purchases without a trial (Stowe & Chamberlain, 1980)[79]
- prescribed in alienating circumstances (Chamberlain et al., 1977)[80]
- without an awareness of the relevant points (Chamberlain et al., 1980)[81]
- because of a change of circumstances (Ibid.)[82]

Cochrane, G.M. (1983) Hospital at Home, Aids in the Home, British Journal of Hospital Medicine, Feb., p121-6

[79] Try Equipment Pre purchase:

'Most respondents would have preferred to have been able to try out the aids before buying, as, in some cases, the aids did not fulfil the respondent's needs.'

Stowe, J. & Chamberlain, M.A. (1980) Aids for Arthritics British Journal of Occupational Therapy, March, p80

[80] Refusal to Use Equipment:

'We found that many people given bath boards never used them - they persisted in entering the bath form a standing position, which is difficult and unsafe. This problem was usually associated with the fact that they (the user) had been assessed in hospital, an alien environment, prior to discharge and the aids had the been delivered many weeks later to their home.'

Chamberlain et al., (1977) in Chamberlain et al. (1980) Aids and Equipment for the Arthritic, The Practitioner, vol. 224, Jan., p66

[81] Prescribing aids:

'Aids should not be prescribed unless the patient wants them and can see benefit from using them.'

'Aids frequently look unpleasant medical and un-aesthetic, although some patients like the invalid image and welcome this. Many more do not and refuse aids which could help them.'

(advice to practitioners)

'(6) Prescribe the simplest equipment (It is most likely to be used)

(5) Do no prescribe an aid when a standard piece of equipment will do the job...'

(7) Show the patients how to use it - and make sure they try it out when you are there.

(8) If possible show them a range of aids and let them make a choice, guided by an Occupational Therapist if possible, preferably at an Aids Centre...'

Chamberlain et al. (1980) Aids and Equipment for the Arthritic, The Practitioner, vol. 224, Jan., p65-6

[82] Aids not used:

It is important to avoid these products being dismissed because they are inappropriate or the user is uninstructed. There are inevitable consequences:

> '...money is wasted, the client's problem is not solved, and the social services or health authorities may be faced with more expensive solutions, perhaps having to take the person into care.' (Cochrane, 1983)[83]

'(c)Use of aids: One year after discharge 231% of all the aids and appliances supplie(s) were not in use... Subjective assessments of the reasons for non-use are shown in Fig.2 Patient improvement accounted for 60% of the non-use particularly of splints and appliances most of which were of a temporary nature...'
Chamberlain et al. (1980) Aids and Equipment for the Arthritic, The Practitioner, vol. 224, Jan., p65-6

[83] If an aid is rejected:
'The selecting, providing and ensuring the continued usefulness of the aid in changing conditions have enormous implications for cost. If the aid is rejected money is wasted, the client's problem is not solved, and the social services or health authorities may be faced with more expensive solutions, perhaps having to take the person into care.'
Cochrane, G.M. (1983) Hospital at Home, Aids in the Home, British Journal of Hospital Medicine, Feb., p121-6

9.10 Design approaches

This section is a presentation of design approaches: a view of design research and the process, in order to put into context and justify my own design practice.

> 'If design researchers hope to make design more responsive to people then they will have to design structural changes into the design process itself.'
> (Mitchell, 1993)[84]

Essentially, working with the intended product user and accepting their experiences, suggestions and ideas as indicators for design development.

9.10.1 What is design research?

Research is defined as a 'careful search investigation; systematic investigation towards increasing the sum of knowledge.' (Schwarz, 1992)[85]. In some disciplines additions to knowledge is the sole reason for research.

At the Royal College of Art conference Design/Research in 1995, Frayling[86], quoted Archer's definition of design research, the: 'Systematic enquiry, the goal of which is knowledge.' By extending this, he described a more dynamic activity: 'systematic enquiry, the goal of which is communicable knowledge.'

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[84] 'If design researchers hope to make design more responsive to people then they will have to design structural changes into the design process itself.'
Mitchell, C.T. (1993) Redefining Designing: From Form to Experience, p62 & 68

[85] 'Research: n. a. careful search investigation; systematic investigation towards increasing the sum of knowledge.'
Schwarz, C. (ed.) (1992) Chambers maxi Paperback Dictionary

[86] 'Systematic enquiry, the goal of which is knowledge'
Archer, B *quoted by* Frayling, C. at the Design Research Conference, Royal College of Art, 20 May, 1995.

'Systematic enquiry, the goal of which is communicable knowledge.'
An extension of Archers hypothesis
Frayling, C. at the Design Research Conference, Royal College of Art, 20 May, 1995.

At the same conference, a triad of concepts were discussed: research into design: practice, process and designed products; research for design: new material science or ergonomics and research through design; information gained as the result of a project or responses to design ideas. This project is concerned with the latter.

Design research involves a cyclic learning where results can be applied to new outcomes and vice versa. For practitioners, design research is purposeful and outward looking, seeking and processing 'communicable knowledge' in the form of visual references, construction drawings and literary or visual promotion work.

Design research would appear to be similar to both 'action' and 'applied research', although not always boasting an 'improvement of the situation being studied'. (Rowntree, 1981)[87] Mitchell (1993)[88] favours the effective nature of practical design research and Whiteley (1993)[89] describes how 'visions and strategies' clarify ideas, this is how a designer works to 'suggest a staged way forward'.

Recently in disability studies emancipatory research has become an ideal to strive for whereby the 'researched' are not only researched but liberated to a degree.

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[87] 'Action Research:... leading to the practical improvement of the situation being studied, may be called 'applied research''.
Rowntree, D. (1981) Dictionary of Education, Research and Development.

[88] '...design research, to be effective, must not consist of ideas about design, as it is the case with environmental-behaviour studies, but rather must be design itself.'
Mitchell, C.T. (1993) Redefining Designing: From Form to Experience , p62 & 68

[89] 'What the protagonist must also do is suggest a staged way forward, otherwise s/he will be dismissed as merely utopian. In other words, both visions and strategies are important; one without the other leads either to daydreaming or to unclear half-measures.'
Whiteley, N. (1993) Design for Society, London: Reaktion Books, p104

9.10.2 Design process

There have been many texts written on the design process particularly in engineering design. But I have chosen two graphic illustrations on the act of designing. Powell (1995)[90] uses the analogy of spinning plates for 'analysing all of the variables that influence the product' and the tenuous nature of maintaining their favourable balance. He also describes the realisation of an idea like a filmed explosion in reverse. (Ibid.)

[90] 'What we try and do is set up a target, but in the process of analysing all of the variables that influence the product. The whole thing can fall apart. This process of keeping things going, is a lot like spinning plates in a circus. If you think of a plate spinner one of these plates is ergonomics, one is easy-clean, one is the bowl capacity (of the food mixer being designed), one is the 'X-factor': how its going to look. And all of these has equal or near equal importance and if you spin the technical engine package one like mad and try sort that problem out, all these other plate fall off their sticks. So what we have got to do is to nudge and try and keep in mind them going all at the same time.'
Powell, R. (1995) Equinox, Designing Dream Machines, 10.12.95, Channel 4, (Transcript for video, written as spoken)

[91] '...If you look at the whole process of design and how designers think. Think of it, like, as if you've seen an explosion on film, run backwards very slowly. What you see is a whole load of dust and rubbish and bits and pieces floating around in the air and as you wind it back it goes (gesturing: bringing hands in towards a central point) very quickly and the design is finished.'
Powell, R. (1995) Equinox, Designing Dream Machines, 10.12.95, Channel 4, (Transcript for video, written as spoken)

9.11 Design process models

Various product design process models have been identified for comparison.

These have been included in the appendices to highlight stages in established design processes with those that developed throughout this project.

Nigel Cross' Idealised flow diagram of the design process (1992), **Appendices 8:1,** depicts the generic stages of any kind of design project and indicates the sequence of elements and their iterations by looped arrows.

Ray and Bruce's Process of technological innovation (1984), **Appendices 8:2,** uses a three column diagram to illustrates a new product being brought to market.

Archer's, 1974, 10 Point Strategic Planning, **Appendices 8:3,** outlines a very tangible check list for product development.

Baxter's, 1995, 'Ground Rules for Systematic Design'[92] have been included here because of its simple overview of the market orientated goals involved:

- 'Establish targets for new product development. These should be clear, concise, specific & verifiable.
- Compare the emerging new product against these targets at several stages during development. *Kill* the product off as soon as it becomes clear that it will fail to meet essential targets.
- Be creative. Generate many ideas and select the best. Don't be afraid of producing ideas which may later prove non-viable.'

[92] Baxter, M. (1995) Product design: Practical Methods for the Systematic Development of new products, London, Chapman & Hall, p6

Each of these demonstrates the sequential nature of the design process.

There appears to be four aspects in initiating a new product:

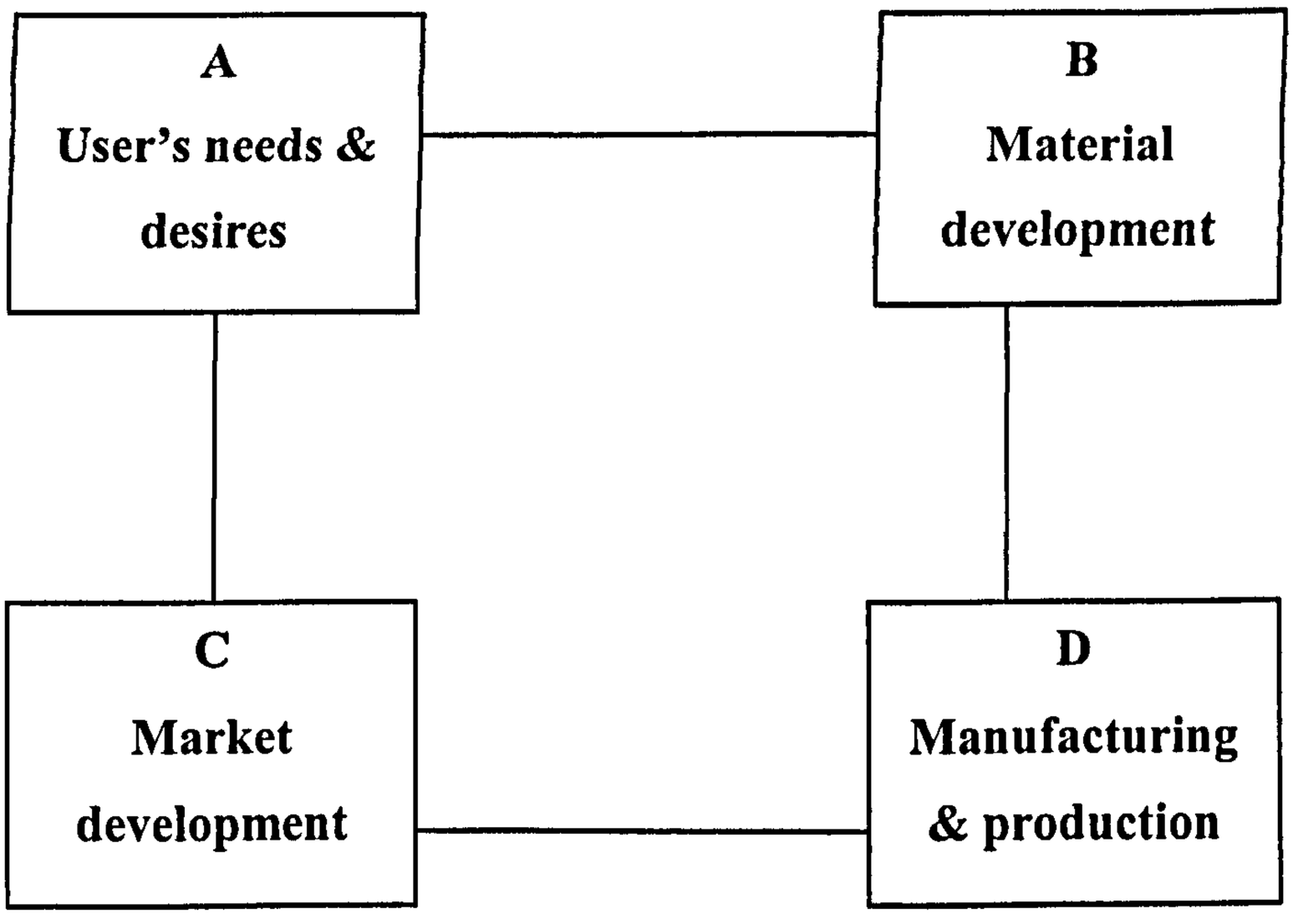

Figure 2. *Emphasis in new product development*

The focus of this project is principally in quadrant A. The following Model of Convergence demonstrates the importance of product user involvement and consultation in the development process.

It does not address marketing development, sales strategies, distribution, production plan, recycling or disposal of the product.

9.12 Summary of how design solutions have been achieved by the process adopted in the thesis.

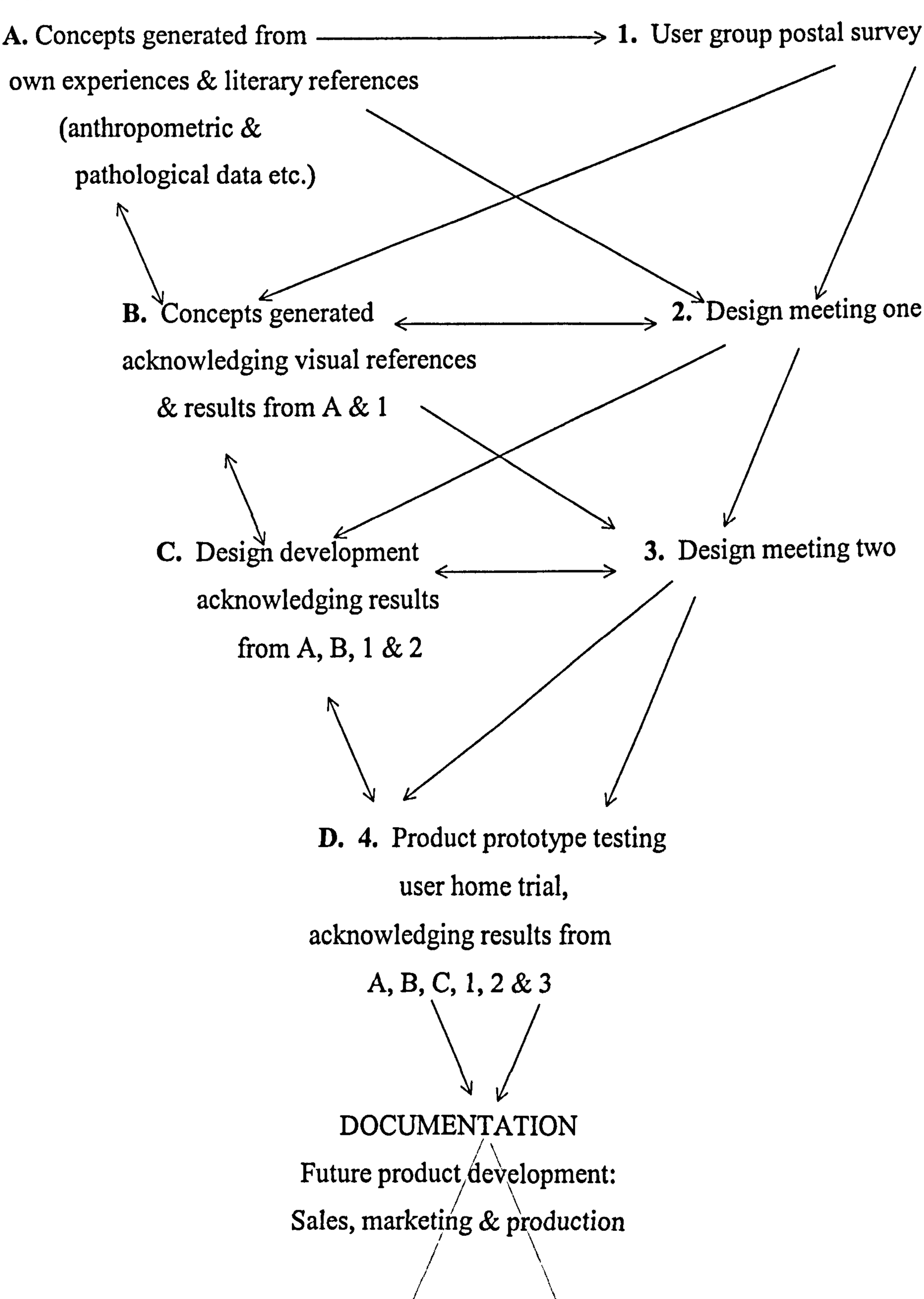

Figure 3. Convergence of increasing real information with real people

9.12.1 Designers designing for themselves

In the past the starting point of many products has been from the designer's experience, the majority of whom were male and aged between 18 and 60 years old. This is obviously not appropriate, as the result will only cater for a minority, approximately 18%, of the population. (Hendereson, *in* Imrie & Wells, 1992) [93]

Dormer (1995)[94] is confident that a designer's personal experience enriches their practice that they 'are not a race apart'. 'Designers find sufficient congruence between what they like to design and what other people like to buy'.

However, Alexander (1977) [95] explains how, as an architect, there are problems designing for many people. Elements that are 'simple, and human, and full of feeling' which he would include in designs for his own satisfaction soon become abstract, 'out of touch' and loose their subtleties when applied to many people. There will be an

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[93] 'A recent report estimated that in Britain approximately 18% of the population are male, fit, aged between 18 and 40, of moderate build and height, have good sight and hearing and are right handed.'
Hendereson, E. (1992) Lifetime Homes, The Helen Hamlyn Foundation, *in*
Imrie, P. & Wells, P. (1992) Town and Country Planning, October, p278

[94] 'Designers are not a race apart. Class for class they live in the same sort of culture as many of their would-be clients, they share the same range of emotions and the same biology and have access to shared traditions and knowledge. It is not surprising that enough designers find sufficient congruence between what they like to design and what other people like to buy.'
Dormer, P. (1995) Furniture Today, London: Crafts Council, p22

[95] '...as I build for myself, the patterns I use will be simple, and human, and full of feeling because I understand my situation. As soon as the few people begin to build for the many their patters about what is needed become abstract, no matter how well meaning they are, their ideas gradually get out of touch with reality, because they are not faced daily with the living examples of what their patterns say.'
Alexander, C. (1977) A pattern Language *in* Mitchell, C.T. (1993) Redefining Designing: From Form to Experience , p64-6

inevitable compromise in mass produced artefacts because it is impossible to satisfy everyone's unique preferences.

Jones (*in* Mitchell, 1993)[96] suggests a change in the practice of design: away from 'the specialised activity of paid experts who shape the physical and abstract forms of industrial life which we all as consumers accept or adapt to.' Products designed by 'interdisciplinary product planning' have been coined 'Humanware' products: 'adapting products to the lifestyle of design users, rather than having a single designer present his or her intuitive 'creation' as a 'fait accompli''. (Ibid.)[97]

Collaboration throughout the entire process should avoid erroneous designs that are generated by false agendas and maybe even simply a lack of knowledge. Mitchell (1993)[98] suggests an equal partnership of designer and non-designer, this would be an exciting start for a new venture.

Reviewing disability products, exhibits at the Museum of Modern Art in New York, McCarty (1988) attributed the success of the designs to 'a collaborative approach to product identification and problem-solving among industrial designers, medical

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[96] '...change but not the assumption that design is limited to the thinking of a few on behalf of the many.'
Jones, J.C. Designing Designing, *in* Mitchell, C.T. (1993) Redefining Designing: From Form to Experience , p64-6

[97] ''Humanware' products are now involved by interdisciplinary product planning teams that concentrate on adapting products to the lifestyle of design users, rather than having a single designer present his or her intuitive 'creation' as a 'fait accompli''.
Mitchell, C.T. (1993) Redefining Designing: From Form to Experience, p62

[98] 'Collaborative design does not simply constitute the participation of users in a designer's process, nor is it collaboration solely among designers; rather it is a means through which designers and non designers alike may participate as equal partners in the design process, shaping not only the outcomes but the aims of designing as well.'
Mitchell, C.T. (1993) Redefining Designing: From Form to Experience, p68

professionals, and users.' Ergonomi is hailed as producing good design and they use a team approach. (Whiteley, 1993)[99]

9.12.2 Experience of disability

What is mis-informing is when people mimic a disability for some sense of understanding. John Bowis, the former Health Minister, in 1996, donned opaque spectacles to find out what it is like not to see, (Anon., 1996)[100] but he could never replicate the experience of blindness. Frankel (1998)[101] writing for the Guardian reminds us that 'no more than 4% of people who are registered blind see nothing at all.' It is essential that assumptions are not made about the experience of a disability, accurate information can only come from asking the right questions, in the right context and for the right reasons (Oliver (a), 1997)[102] & (Oliver (b), 1997)[103].

Much precise information is needed by a designer when designing products. This would be true for a male designer designing a bra or a breast pump or if the products being designed were for a person with a disability. Torrens (1994)[104] reiterates the

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[99] 'In collaboration with a doctor, a physiotherapist a number of patients the group (Ergonomi/ RFSU) analysed the limitations of conventional 'walking sticks' and canes.'
Whiteley, N. (1993) Design for Society, London: Reaktion Books, p118

[100] Anon. (1996) Disability Now, News, June 1996, p5

[101] Frankel, S. (1998) The Guardian: Weekend, Body Beautiful, 29.8.98, p18

[102] Oliver, M. (1997) Final Accounts and the Parasite People, Doing Disability Research Conference, at Leeds University, 3-4 Sept. 1997

[103] '...we as researchers gain, but mainly at the expense of those whose lives we have researched. While our intentions have been honourable, we remain on the wrong side of the oppressive social and material relations of research production.' p26
Oliver, M. (1997) Doing Disability Research, Emancipatory Research: An realistic goal impossible dream? The Disability Press, Leeds, p15-31

[104] 'Designers will almost never have experienced the problems faced by the potential user, and there is little data available to enable a 'text book' solution to be satisfactory. The designer must actively involve potential users at each stage of the design process:

fact that a designer would most probably be working outside his or her area of personal experience. Tacit knowledge, where applicable is considered valuable, (Whiteley, 1993)[105] however, where it is lacking, an accumulation of accurate and relevant information is essential.

However, when undertaking this research, Torrens (1994/5)[106] complains of a 'lack of information, concisely presented, to assist designers when producing a profile of the functional capabilities of a disabled person who has a medically diagnosed condition.' Johnston & Barber's research work, (1996)[107], goes some way to remedy the insufficiency in this area, although their 'information focuses on people' rather than

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during specification, design, prototyped development and final testing. Only in this way can a useful and commercially viable product be produced.' p8
Torrens, G. (1994) Proceedings: A discussion of research and development methods through to a commercial conclusion, Conference of the European Academy of design, Designing for physical disability, December 17, 1994, University of Salford, p8

[105] 'Design methodologists acknowledge that 'tacit knowledge' is an essential component of the skills and qualitative decision making process of designers. It is the difference between 'knowing what' and 'knowing how': the former refers to the explicitly stated rules of doing something; and the latter is the implicitly and internalised knowledge of doing something.'
Whiteley, N. (1993) Design for Society, London: Reaktion Books, p145

[106] '...there is a lack of information, concisely presented, to assist designers when producing a profile of the functional capabilities of a disabled person who has medically diagnosed condition.' p4
Torrens, G. (1994-5) Usertalk, Getting a grip: developing an Understanding of hand and product interaction during task performance, no.7, winter

[107] '...our aim has been to improve the design of products used by people who physically disabled. We help designers working in the field, by providing them with the insights generated by real-life qualitative information.' p12
'The point, in a sense, is that the design possibilities are opening up by information that focuses on people rather than the 'Meccano' aspects of the product. The result, we hope, is that new products could be developed that are tailored to meet the needs and tastes of each specific consumer group, just as they are for the able-bodied.'
Johnston, M. & Barber, J. (1996) Design, Ordinary People, Spring 1996, p12 & 13

medical conditions. They present 'insights generated by real-life qualitative information.'

Where secondary sources are not available primary design research is an essential practice. For Mitchell (1993)[108], 'the proper focus of the design process is users' experience, not physical form.'

Sudjic (1994)[109] says of Stumpf and Chadwick, while designing their Aeron chair, 'Defining comfort involved looking at how real people would choose to work, given the chance.' They critically viewed the current situation and went further to address user preferences.

Involving product users in the design development stage benefits the designer (Torrens, 1994)[110] and ensures the design optimises a person's abilities. (McCarty, 1988)[111] & (Ward, Rogers et al., 1996)[112]

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[108] Mitchell, C.T. (1993) Redefining Designing: From Form to Experience , p66

[109] 'Defining comfort involved looking at how real people would choose to work, given the chance.' p35
Sudjic, D. (1994) Blueprint (Promotion), (Playfulness) Have these men designed the most comfortable chair in the world?, October, 29-36

[110] 'Working closely with users highlighted priorities for the development of other products... p1
The experience of working closely with the potential end users of new products helps solidify the results found through market research techniques... p5
Informal contact with disabled people more informative. Spending time with people who have to cope continuously with their disabilities can help a designer prioritise areas initially thought less important through the intermittent observation and more formal discussion of standard market research techniques...p6
Designers will almost never have experienced the problems faced by the potential user, and there is little data available to enable a 'text book' solution to be satisfactory. The designer must actively involve potential users at each stage of the design process: during specification, design, prototyped development and final testing. Only in this way can a useful and commercially viable product be produced.' p8

User involvement should prompt a symbiotic relationship: participants involved with projects should 'gain' from the experience. In this case, by offering them alternative design solutions, an opportunity to experiment with alternative products, information and some reward.

9.12.3 Working with product users

There may be several reasons to test a product with potential user groups. To confirm ideas, explore concepts and essentially to receive feedback. Torrens (1996)[113]

Torrens, G. (1994) Proceedings: A discussion of research and development methods through to a commercial conclusion, Conference of the European Academy of design, Designing for physical disability, December 17, 1994, University of Salford, p5,6 & 8

[111] 'These new designs derive from a collaborative approach to product identification and problem-solving among industrial designers, medical professionals, and users. ...it is imperative to involve the user in the design process, for the objective is to develop aids that make maximum use of a person's abilities.'
McCarty, C. (1988) Tools, Designs for Independent Living, vol.4, no.4, Jun., p18-19.

[112] 'To function effectively a product must be matched to the capabilities of all its intended users, and this matching process enquires that the designer have a good knowledge of the nature of these capabilities.' p42

'Fundamental ergonomic design is the concept of matching the capabilities of a product user or system operator to the demands placed upon them by the product or system. (references 11: Fatetti, M.V. & Clark, M.C. (1983) A Capability Demand Approach to the Aged in Technological Environments in Robinson, P.K. & Livingstone, J. et al. (Eds) Aging & Technological Advances, Plenum: New York & 12: Kondraske, G. (1995) Strategies and Instruments for Human Performance Measurement. In Tremewan, R. (Ed.) Proceedings of Engineering and Physical in Medicine, Queenstown, New Zeland. Australasian College of Physical Scientists and Engineers in Medicine: Aukland) p35
Ward, J., Rogers, N. et al. (1996) Journal of Rehabilitation Sciences, Techniques for the measurement of the human body and its actions: applicable to design for physically disabled people, issue 9, no.2. p42

[113] 'There is a perceived higher risk of litigation with an AT product than with mainstream products. This means more resources must be used to evaluate the product, with the end users, to ensure that all aspects of the product can be shown to be tested.'

advocates a testing procedure to quell potential concerns of : 'a perceived higher risk of litigation with an AT (Assistive Technology) product than with mainstream products.'

Full sized, working prototypes are an efficient means of communicating design ideas to user groups. More so than concept drawings. (Torrens, 1994)[114] With the improvement of computer modelling and imaging, prototypes are beginning to be used less. Ward, Rogers et al., (1996)[115] consider this will lead to fewer chances for disabled users contributing to the design of products. However, in 1997, Priestman Goode would still expect to work with 50 cast prototypes of an electrical product in its development phase. (Lewis, 1997)[116]

Torrens, G. (1996) The early exploitation of Prototyping to enhance design problem analysis and product development in the field of Assistive Technology, Poster Presentation at IDATER 1996, Loughborough University, p218

[114] '...Working prototypes were the most efficient way of assessing the products, while concept drawings were found to be of limited value.'p1
Torrens, G. (1994) Proceedings : A discussion of research and development methods through to a commercial conclusion, Conference of the European Academy of design, Designing for physical disability, December 17, 1994, University of Salford, p1

[115] 'The number of prototypes necessary during the development period is being reduced, and with this comes a reduction in the opportunities for evaluation of the effectiveness of a product in the hands of a disabled user.'
Ward, J., Rogers, N. et al. (1996) Journal of Rehabilitation Sciences, Techniques for the measurement of the human body and its actions: applicable to design for physically disabled people, issue 9, no.2. p35

[116] 'Priestman Goode would expect to be working on the project (a 'small electrical product' such as a camera) for just over a year... Up to 50 cast models produced for product testing and samples for exhibitors and product launch.' Lewis, J. (1997) Design Week, Free Market, 1.8.97, p15

9.13 Contemporary perspective of disability

In compiling this contemporary perspective of disability I was reassured to find other disciplines outside of design, particularly politics and social studies, had already given voice to many of my thoughts. Wary of being swamped by theoretical models, indeed taking Oliver's advice, (*in* Barnes & Mercer, 1996)[117] I have highlighted salient areas.

9.13.1 Definitions of disability

There are many interpretations of the word 'disability' depending on its context, the purpose and experience of the person using it.

9.13.1.1 Individual model of disability

The individual model of disability is seen as a 'personal tragedy' and solely resultant of a person's 'functional limitations which their disability is assumed to cause'. (Debenham, 1998)[118] The social model of disability is considered a means of shifting this perception. (Crow, *in* Barnes & Mercer, 1996)[119]

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[117] '...we must not assume that models are general and the social model of disability in particular can do everything; that it can explain disability in totality'
Oliver, M. 'Defining Impairment & Disability: Issues at Stake' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, The Disability Press: Leeds, p52

[118] 'Traditionally, disability has been considered an individual problem. The individual model of disability presents the problems disabled people face as stemming entirely from the functional limitations which their disability is assumed to cause. This leads to the personal tragedy view of disability - that it is some terrible misfortune which occurs at random to certain individuals. The individual model is often (some would say misleadingly) referred to as the medical model of disability).
Recent thinking favours the social model of disability. It states that it is society's failure to provide an accessible environment rather that (sic) the individual's limitations that causes the problems for disabled people ...it addresses society's failure to take the needs of disabled people as a group into account...'
Debenham, C. (1998) Arthritis News, Making Sense of the World, no. 81, Dec-Jan 1998-9, p10

[119] 'The social model of disability has been our key to dismantling the traditional concept of impairment as 'personal tragedy'...'

9.13.1.2 Medical model of disability

The medical model focuses on the limitations of the body and these are considered 'root cause of any disadvantages experienced and these disadvantages can therefore only be rectified by treatment or cure.' (Crow, *in* Barnes & Mercer, 1996)[120] Ward, 1974 (*in* Carver & Rodda, 1978)[121], describes a medical condition as being the 'precipitating event for disability'. However, Ward, (Ibid.)[122] also states ... 'there is no direct relationship between a condition and a function.'

Carver and Rodda (1978)[123] viewed the 'functional consequences of disability, the impairment', as more important than 'medical classification'. Incidentally, one area where the 'functional consequences of disability' is scrutinised for a positive end is in competitive sports. (Gardener, 1994)[124]

Crow, L. 'Including all of our Lives' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide; Illness and Disability, Leeds: The Disability Press, p62

[120] 'Within this framework, which is often called the medical model of disability, a person's functional limitations (impairments) are the root cause of any disadvantages experienced and these disadvantages can therefore only be rectified by treatment or cure.'
Crow, L. 'Including all of our lives' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p57

[121] 'A condition is the medical, psychological or social state and is the precipitating event for disability...' Ward (1974) *in* Carver & Rodda (1978) Disability and the Environment, Southampton: Camelot Press, p1-11, p103-115

[122] '...The function is the adaptation, with or without help, that the individual makes to the precipitation condition. There is no direct relationship between a condition and a function.' Ward, (1974) *in* Carver & Rodda, (1978) Disability and the Environment, Southampton: Camelot Press, p1-11, p103-115

[123] '...Less concerned with medical classification and descriptions of disabling conditions ...and pay more attention to the... functional consequences of disability...' (Carver & Rodda, 1978) Disability and the Environment, Southampton: Camelot Press, p1-11, p103-115

[124] '...Disabled swimmers are classified according to their functional physical ability and are place in ten classes, athletes in class one being those with the least functional physical

The following definition from the World Health Organisation has been used internationally for almost two decades:

> '**Impairment:** Any loss or abnormality of psychological, physiological, or anatomical structure or function. **Disability:** any restriction or lack (resulting from impairment) of ability to perform an activity in the manner or within the range considered normal for a human being. *(in a given culture)* **Handicap:** A disadvantage for a given individual, resulting from an impairment or disability, that limits or prevents fulfilment of a role that is normal, depending on age, sex, social or cultural factors' (WHO, 1980)[125]

9.13.1.3 Social model of disability

The Disabled People's International (DPI), 1994[126], challenged the WHO definition (above) on the grounds that an individual is disabled by their environment and placing

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ability and those in class ten having the most. An athlete in class S9 may have one of several types of disabilities, including paraplegia with minimal effect of the legs: polio with an unfunctional leg; single leg amputation, above knee, single arm, amputation, below the elbow; or generalised co-ordination problems such as Cerebral Palsy. The athletes in a given class such as S9 may not all have the same type of disability, but they are judged to the same level of functional physical ability.' Gardener, K. (1994) Disabled and Supportive Carer, Summer, p5 & 45

[125] International Classification of Impairments, Disabilities and Handicaps, Geneva.

[126] (Oliver, 1996) 'At a recent meeting of disabled people from all over Europe, the group decided to reaffirm their own definition of disability and spell out the implications of this for the WHO schema:

> 'A Disabled Person is an individual in their own right, placed in a disabling situation, brought about by environmental, economic and social barriers that the person, because of their impairment(s), cannot overcome in the same way as other citizens. These barriers are all too often reinforced by the marginalising attitudes of society. It is up to society to eliminate, reduce or compensate for these barriers in order to enable each individual to enjoy full citizenship, respecting the rights and duties of each individual.
>
> By supporting this resolution, this meeting on human rights, expresses its non-support for the current classification of impairment, disability and

the duty to make reparations on society. The Union of the Physically Impaired Against Segregation (UPIAS), in their definition of disability reiterate this sentiment:

> 'DISABILITY: the disadvantage or restriction of activity caused by a contemporary social organisation which takes little or no account of people who have physical impairments and thus excluded them from mainstream of social activities.' (UPIAS, 1976).' in (Oliver, *in* Barnes & Mercer, 1996)[127]

The social model of disability 'rejects the notion of impairment as problematic focusing instead on discrimination as the key obstacle to a disabled person's quality of living.' (Crow, *in* Barnes & Mercer, 1996)[128] It 'shifts the focus from impairment

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handicap operated by the World Health Organisation. We call upon the WHO to enter into a dialogue with disabled people's organisations to adopt a new definition in line with the above resolution' (DPI, 1994)'

Oliver, M. 'Defining Impairment & Disability: Issues at Stake' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p47

[127] UPIAS definition of disability:

'Ironically it is only the definition advanced by the Union of the Physically Impaired Against Segregation (UPIAS) that can accommodate the development of a politics of difference. While its definition of impairment is similar to that of DPI, its definition of disability is radically different:

'DISABILITY: the disadvantage or restriction of activity caused by a contemporary social organisation which takes little or no account of people who have physical impairments and thus excluded them from mainstream of social activities.' (UPIAS, 1976).'

Oliver, M. 'Defining Impairment & Disability: Issues at Stake' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p44

[128] 'The social model of disability rejects the notion of impairment as problematic, focusing instead on discrimination as the key obstacle to a disabled person's quality of living.'

Crow, L. 'Including all of our lives' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p65

onto disability, using this term to refer to disabling social, environmental and attitudinal barriers rather than lack of ability.' (Ibid.)[129]

Wolverhampton's Family Health Services Authority and the Voluntary Sector Community Care Forum produced a statement which reflects this Social model perspective

> 'The partners accept the premise that disadvantage experienced by persons with a disability in our town is a direct consequence of a failure to respond appropriately to their individual and social needs rather than the result of the individual disabled person's impairment.' (Anon, 1994)[130]

In a recent claim for disability living allowance (DLA), to 'lead a proper social life', Becky Halliday's test case positively supports the social model of disability. (Brindle, 1997)[131] By being awarded funding for social activities, her case was seen as going beyond the necessities needed 'to keep body and soul together' (Frean, 1997)[132]

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[129] 'The social model, in contrast, shifts the focus from impairment onto disability, using this term to refer to disabling social, environmental and attitudinal barriers rather than lack of ability.'
Crow, L. 'Including all of our lives' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p57

[130] 'The partners accept the premise that disadvantage experienced by persons with a disability in our town is a direct consequence of a failure to respond appropriately to their individual and social needs rather than the result of the individual disabled person's impairment.' (Anon, 1994)
Wolverhampton: Local Authority, Health Authority, Family Health Services Authority and the Voluntary Sector Community Care Forum, (1994) 'A joint Equality Policy for People with Physical and Sensory Disabilities in Wolverhampton'. Physical and Sensory Disabilities, Community Care Plan 1994

[131] 'A 22-year-old deaf woman has won the right to state funding for a sign language interpreter to accompany her on outings, in the House of Lords ruling, which entitles disabled people to help in leading a proper social life
Becky Halliday, from Newark, Nottinghamshire, was seeking the right to claim disability living allowance (Disability Living Allowance) to help pay for an interpreter when meeting friends or going to the theatre or other social outings.

The aim is 'inclusion' by 'a strategy of barrier removal, or education to remove prejudice'. (Shakespeare, *in* Barnes & Mercer, 1996)[133]

9.13.1.4 Differences between social & medical model

Shakespeare, (Ibid.)[134], distinguishes the difference in perception in the social and medical models of disability: 'Medical approaches considers negative self to be an

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'The Department of Social Security (DSS) had argued that such social activities were desirable rather than required in connection with 'bodily functions'.
But five lords ruled it was not reasonable for a disabled person to regard a proper social life as a requirement.'
Brindle, D (1997) The Guardian, 'Deaf woman wins benefit payment to aid social life', 22.5.97, Home News, p6

[132] 'Five law lords ruled that Becky Halliday, 22, was entitled to a disability allowance to help her meet the extra costs caused by her deafness. These include hiring a sign-language interpreter to help her when attending job interviews or when taking part in social activities with hearing friends.
'David Thomas, legal officer with the Child Poverty Action Group, which backed Miss Halliday's cases, said that the ruling represented a 'seismic shift' in the way that benefit rules would be interpreted. 'Before, the allowance was given on the basis of what was essential to keep body and soul together. Now they have to consider what it takes to help a person lead a normal and full life in the community,' he said.'
'The department had argued that social activities were simply 'desirable' rather than being "reasonably required" essentials relating to bodily functions. Campaigners for the disabled said that the ruling would have a dramatic impact on the lives of the deaf, blind and other disabled people.'
Frean, A. (1997) The Times, 'State must pay for deaf nurse's nights out.' 22.5.97, Home News, p3

[133] '*The social model*, which focuses on the disability as a relationship between people with impairment and a discriminatory society: disability is defined as the outcome of disabling barriers imposed by environmental or policy interventions. It suggests a strategy of barrier removal, or education to remove prejudice, with the goal of inclusion.' (Shakespeare, 1996, p97)
Shakespeare, T. 'Disability, Identity & Difference' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p97

outcome of physical impairment, and focus on the need for adjustment, mourning, and coming to terms with loss. Social approaches view negative self-identity as a result of the experience of oppressive social relations, and focus attention on the possibilities for changing society, empowering disabled people, and promoting a different self-understanding.'

Oliver, (*in* Barnes & Mercer, 1996)[135], identified that the use of negative terminology in 'medical discourse' offends disabled people or they 'feel that it distorts their experiences' … 'and discussions of suffering in many studies have the effect of casting disabled people in the role of the victim.'

9.13.1.4.1 Medical or social intervention?

Medicine itself is not problematic, it is how it has been seen to be used and in particular if it is used as the arbitrator of social resources. Debenham, (1998)[136]

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[134] 'Medical approaches considers negative self to be an outcome of physical impairment, and focus on the need for adjustment, mourning, and coming to terms with loss. Social approaches view negative self-identity as a result of the experience of oppressive social relations, and focus attention on the possibilities for changing society, empowering disabled people, and promoting a different self-understanding.'
Shakespeare, T. 'Disability, Identity & Difference' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p99

[135] '…the language used in much medical discourse including medical sociology is replete with words and meanings which many disabled people find offensive or feel that it distorts their experiences. In particular the term chronic illness is for many people an unnecessarily negative term, and discussions of suffering in many studies have the effect of casting disabled people in the role of the victim.'
Oliver, M. 'Defining Impairment & Disability: Issues at Stake' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p43

[136] 'Authors of the social model argue that disability is a social state, not a medical condition, therefore medical intervention in disability is inappropriate. 'Doctors are trained to diagnose, treat and cure illnesses, not to alleviate social conditions or circumstances,' says Mike Oliver.'
Debenham, C. (1998) Arthritis News, Making Sense of the World, no. 81, Dec-Jan 1998-9, p11

credits Oliver as saying 'Doctors are trained to diagnose, treat and cure illnesses, not to alleviate social conditions or circumstances...'

The question is raised '...which aspects of disabled people's lives need medical or therapeutic interventions, which aspects require policy developments and which require political action.' (Oliver, *in* Barnes & Mercer, 1996)[137] Crow, (*in* Barnes & Mercer, 1996)[138], is of the opinion that 'this leads policy-makers and professionals to seek a 'solution' through the removal of impairment.' If the impairment is not removed it might be 'disguised or concealed' by 'cosmetic surgery and prostheses which have no practical function and may actually inhibit an individual's use of their body... Others are taught to struggle for hours to dress themselves when the provision of personal assistance would be more effective.' (Ibid.)[139] The concept of

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[137] 'The conceptual issue underpinning this debate, therefore is about, determining which aspects of disabled people's lives need medical or therapeutic interventions, which aspects require policy developments and which require political action.' (Oliver, 1996)
Oliver, M. 'Defining Impairment & Disability: Issues at Stake' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p43

[138] 'Currently, the treatment available is dominated by the medical model's individualistic interpretation of impairment as tragic and problematic and the sole cause of disadvantage and difficulty. This leads policy-makers and professionals to seek a 'solution' through the removal of impairment.'
Crow, L. 'Including all of our lives' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p62

[139] '...much of the work in this area, rather than increasing an individual's access to and control over the help that they might need, is more about disguising or concealing impairment. Huge amounts of energy and resources are spent by medical and rehabilitation services to achieve this. For example, many individuals are prescribed cosmetic surgery and prostheses which have no practical function and may actually inhibit an individual's use of their body. Others are taught to struggle for hours to dress themselves when the provision of personal assistance would be more effective.'
Crow, L. 'Including all of our lives' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p63-4

independence does not mean doing everything one's self. (Hassan, 1994)[140] But having a sustainable autonomy.

9.13.1.4.2 Normality

The notion of rehabilitating an impairment aims to 'restore the disabled person to normality, whatever that may mean...' (Oliver *in* Debenham 1996)[141] Shakespeare (*in* Barnes & Mercer, 1996)[142] considers it as 'performing and conforming: both raise the question of normality, because this approach assumes a certain standard from which disabled people deviate.' In a position where there is a perceived norm people adapt their behaviour '...denial may be involved, where a person claims to be normal and tries to minimise the importance of impairment in their lives, perhaps in

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[140] '...This idea that, its taken you three hours to put your socks on but you did it - that's what independence is all about? Stuff it, you know I don't want to spend three hours putting my socks on, I'd rather go out. And they don't allow us often the choice to say I can do this comfortably but I find this difficult to do. Its almost like its good for us to struggle.'
Hassan, A. (1994?) Exploring the Social Model of Disability, Young Arthritis Care Arthritis Care: London, (Video)

[141] 'Central to the individual model of disability is the quest to be 'normal'. Mike Oliver claims that the whole medical and rehabilitation enterprise is founded on an ideology of normality. 'Its aim is to restore the disabled person to normality, whatever that may mean,' ...'
Debenham, C. (1998) Arthritis News, Making Sense of the World, no. 81, Dec-Jan 1998-9, p11

[142] '...disability as the outcome of impairment: it is a form of biological determinism, because it focuses on physical difference... the group of people whose bodies don't work; or look different or act differently; or who cannot do productive work. The key elements of this analysis are performing and conforming: both raise the question of normality, because this approach assumes a certain standard from which disabled people deviate.'
Shakespeare, T. 'Disability, Identity & Difference' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p94-113

concealment: in Goffman's (1968) terms, they may pass as normal... another form of denial seeks to 'overcome' impairment.' (Ibid.)[143]

Although available, some medical interventions are refused on moral grounds. 'Rejections of the 'cure'', controversially question therapeutic practices in order to achieve a 'normality', favouring 'a culture of disability based on pride' and 'upon the celebration of difference.' (Oliver, *in* Barnes & Mercer, 1996) [144] However, Crow (*in* Barnes & Mercer, 1996)[145] raises the lack of alternatives once 'rehabilitation professional approaches to treatment' are refused.

These strong stances are taken with much consideration and maintenance of personal identity. It is for this reason that disabled people should be making decisions for

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[143] '...denial may be involved, where a person claims to be normal and tries to minimise the importance of impairment in their lives, perhaps in concealment: in Goffman's (1968) terms, they may pass as normal... another form of denial seeks to 'overcome' impairment.'
Shakespeare, T. 'Disability, Identity & Difference' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p100

[144] 'From rejections of the 'cure', through critiques of supposedly therapeutic interventions such as conductive education, cochlea implants and the like, and onto attempts to build a culture of disability based on pride, the idea of normality is increasingly coming under attack.'
'In the WHO schema it is normal social roles and in the DPI schema it is the normal life of the community. The problem with both of these is that increasingly the disability movement throughout the world is rejecting approaches based upon the restoration of normality and insisting on approaches based upon the celebration of difference.'
Oliver, M. 'Defining Impairment & Disability: Issues at Stake' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p44

[145] '...rejection of medical and rehabilitation professional approaches to treatment and cure has not been accompanied by an exploration of what forms of intervention *would* be useful.'
Crow, L. 'Including all of our lives' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p66

disabled people: the tacit knowledge of understanding such experiences. (Ward & Flynn, 1994, p29 *in* Oliver (Ibid.)[146]

9.13.2 Reactions to definitions of disability and handicap

Although it is possible to construct an outline for the definition of disability, it would be wrong to give the impression that it is a simple issue. Vic Finklestein, a disabled person and writer on disability issues, expresses a dislike for the word 'disabled' as it promotes an image of 'broken able-bodied people'.

Jane Campbell involved with the British Council of Disabled People is of the opinion that 'disabled is a term imposed by able bodied (people)'. She did not give an alternative which may have been as a reaction against being labelled and pigeon-holed.

Oliver, (*in* Barnes & Mercer, 1996)[147] disapproves of the 'continued use of the term 'handicap' by the WHO schema. This is an anathema to many disabled people

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[146] 'This reiterates the importance of organisations **of** disabled people rather than organisations **for** disabled people.
'The ways in which disabled people have been systematically excluded from the definitional process...:
'Those convening on the seminar are proud that it will shine a spotlight on a usually neglected area of social science research. But some in the audience (and one or two others who have chosen not to attend) hold a different view. What credibility can such a seminar muster, they ask, when none of those chairing or presenting papers are themselves disabled? What does it say about current understanding of disability research issues that such an event had been allowed to go ahead in this form, when a symposium on researching gender issues given entirely by men or race relations research given entirely by white people, would have been laughed our of court?' (Ward & Flynn, 1994, p29)
Oliver, M. 'Defining Impairment & Disability: Issues at Stake' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p46

[147] A major bone of contention is the continued use of the term 'handicap' by the WHO schema. This is an anathema to many disabled people because of its connections to 'cap in hand' and the degrading role that charity and charitable institutions play in our lives.'

because of its connections to 'cap in hand' and the degrading role that charity and charitable institutions play in our lives.'

9.13.2.1 Impaired but not disabled?

Foley and Pratt, (1994)[148] seeing disability and impairment as separate phenomena find the matter straight forward: 'Many people who have physical impairments do not define themselves as disabled, and are not regarded as such by society, because their impairments do not lead to social exclusion.'

Aimmee Mullins, whilst being interviewed about her work as a catwalk model, said of her identity: 'I'm not disabled... I'm an amputee. That's different.' O'Sullivan, (1998)[149]

Medically classified as impaired and in some cases disabled, some deaf people, who consider themselves deaf with a capital 'D' have forged a strong identity through an interpretation of their medical condition and environment. Owing to their primary, and in some cases exclusive, use of sign language Deaf people are urging to be identified as a linguistic minority. They would, for example defend, their position as Deaf first and English second

Crow (Ibid.)[150] points out '...there is an interpretation of the subjective experience of impairment in which an individual binds their own meanings to the definition of impairment to convey their personal circumstances.'

Oliver, M. 'Defining Impairment & Disability: Issues at Stake' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p44

[148] 'Many people who have physical impairments do not define themselves as disabled, and are not regarded as such by society, because their impairments do not lead to social exclusion.'
Foley, C. & Pratt, S. (1994) Access Denied, National Council for Civil Liberties, p21& 23.

[149] O'Sullivan, J. (1998) The Independent, Cold Call: Jack O'Sullivan rings Aimee Mullins, 3.10.98

Depending on the context, being identified as disabled can be an emotive issue for individuals. (Shakespeare, *in* Barnes & Mercer,1996)[151]

9.13.2.2 Apparent contradictions of disability

Through Oliver, discussing the work of his contemporaries in the field of Disability Studies, I have been able to understand the apparent contradictions of meaning of disability.

Oliver, (*in* Barnes & Mercer, 1996)[152], responding to Williams, 1991, says of the earlier DPI definition:

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[150] '...there is an interpretation of the subjective experience of impairment in which an individual binds their own meanings to the definition of impairment to convey their personal circumstances.'
Crow, L. 'Including all of our lives' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press,, p61

[151] '...many people with impairments do not identify as disabled. Some have even been viewed as traitors to the disability community, as selling out, as tokens. For example, Bert Massie, director of RADAR, faces much opposition. So clearly not all disabled people are allies.'
Shakespeare, T. 'Disability, Identity & Difference' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p109

[152] 'These schemas appear to be incompatible and have led one sociologist critically to suggest:

> 'Sometimes, in seeking to reject the reductionism of the medical model and its institutional context, proponents of independent living have tended to discuss disablement as if it had nothing to do with the physical body'. (William's, 1991, p521)

Ironically that is precisely what the DPI definition insists, disablement is nothing to do with body. It is a consequence of the failure of social organisation to take account of the differing needs of disabled people to remove the barriers they encounter.'
Oliver, M. 'Defining Impairment & Disability: Issues at Stake' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p42

'Ironically that is precisely what the DPI definition insists, disablement is nothing to do with the body. It is a consequence of the failure of social organisation to take account of the differing needs of disabled people to remove the barriers they encounter.'

Shakespeare (1992) reasons this concept in terms of oppression:

'The achievement of the disability movement has been to break the link between our bodies and our social situation, and to focus on the real cause of disability, i.e. discrimination and prejudice. To mention biology, to admit pain, to confront our impairments, has been to risk the oppressors seizing on evidence that disability is "really" about physical limitation after all.'
In Oliver (*in* Barnes & Mercer, 1996) [153]

However, in an ideal world '...when disability comes to an end there will be no socially-created barriers to transport, housing, education and so on for people with impairments', Crow (Ibid.)[154] considers it likely that '...impairment may well be unaltered and some individuals will find that disadvantages remain.'

Morris (1991) expressed concern that the social model could 'deny the experience of our own bodies, insisting that our physical differences and restrictions are entirely

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[153] 'The achievement of *the disability* movement has been to break the link between our bodies and our social situation, and to focus on the real cause of disability, i.e. discrimination and prejudice. To mention biology, to admit pain, to confront our impairments, has been to risk the oppressors seizing on evidence that disability is "really" about physical limitation after all.'
Shakespeare (1992, p40) *quoted in* Oliver, M. 'Defining Impairment & Disability: Issues at Stake' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p48-9

[154] '...when disability comes to an end there will be no socially-created barriers to transport, housing, education and so on for people with impairments.'
'...In this non-disabling society, however, impairment may well be unaltered and some individuals will find that disadvantages remain.' p67
'...its does mean that for many disabled people personal struggle related to impairment will remain even when disabling barriers no longer exist.' p58
Crow, L. 'Including all of our lives' in Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, The Disability Press: Leeds, p67 & 58

socially created.' '...to suggest that this is all there is to it is to deny the personal experience of physical or intellectual restrictions, of illness of the fear of dying.' (*In* Oliver *in* Barnes & Mercer, 1996) [155] & Crow (Ibid.)[156]

Crow (Ibid.)[157] argues for an acknowledgement that impairment 'exists alongside disability':

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[155] '...there is a tendency within the social model of disability to deny the experience of our own bodies, insisting that our physical differences and restrictions are entirely socially created. While environmental barriers and social attitudes are a crucial part of our experience of disability - and do indeed disable us - to suggest that this is all there is to it is to deny the personal experience of physical or intellectual restrictions, of illness of the fear of dying.'
Morris (1991, p10) *quoted in* Oliver, M. 'Defining Impairment & Disability: Issues at Stake' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p48

[156] 'It is this rejection of impairment as problematic, however, that is the social model's flaw. Although social factors *do* generally dominate in determining experience and quality of life... impairment *is* relevant. For fear of appearing to endorse mainstream interpretation, we are in danger of failing to acknowledge that for some individuals impairment - as well as disability - causes disadvantage.' p65
'Impairment *is* problematic for many people who experience pain, illness, shortened life span or other factors. As a result, they may seek treatment to minimise these consequences and, in extreme circumstances, may no longer wish to live. It is vital not to assume that they are experiencing a kind of false consciousness - that if all the external disabling barriers were removed they would no longer feel like this.'
Crow, L. 'Including all of our lives' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p65 & 6

[157] 'In conclusion: I am arguing for a recognition of the implications of impairment. I am not supporting traditional perspectives on disability and impairment... Disability remains our primary concern, and impairment exists alongside.'

'What this renewed social model of disability does is broaden and strengthen the current social model, taking it beyond grand theory and into real life... This understanding needs to influence the structure of our movement - how we organise and campaign, and how we include and support each other.'
Crow, L. 'Including all of our lives' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p71

> '...the most common cause of impairment amongst women is the chronic condition, arthritis, where the major manifestations of impairment is pain. Unless the social model of disability incorporates a recognition of the patterns of impairment experienced by different social groups, there will be a failure to develop appropriate services.' Crow (Ibid.)[158]

Furthering this debate, facing the awkward realities, not only are impairments recognised as a part of the equation, but also, for some, 'a negative, painful experience.' Crow (Ibid.)[159]

By 'taking it beyond grand theory and into real life', a renewed social model of disability could 'influence the structure of our movement - how we organise and campaign, and how we include and support each other.'

9.13.2.3 The identity of disability

Shakespeare, (1996)[160] explains how the 'experience of disability', has been viewed as a negative identity. It 'arises out of a process of socialisation... in which

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[158] '...the most common cause of impairment amongst women is the chronic condition, arthritis, where the major manifestations of impairment is pain. Unless the social model of disability incorporates a recognition of the patterns of impairment experienced by different social groups, there will be a failure to develop appropriate services.'
Crow, L. 'Including all of our lives' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p69-70

[159] '...limitations to an individual's health and energy levels or their experience of pain may constrain their participation in activities. Impairment itself can be a negative, painful experience.'
Crow, L. 'Including all of our lives' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p67

[160] 'The experience of disability as a negative identity arises out of a process of socialisation, or in the context of social relations, in which impairment is the sole focus of analysis. Grief and loss are turned inwards, and suffering focuses on the self. In the absence of other socially sanctioned identities, the professional cripple role enables successful interaction with professionals, offering the benefits of sympathy and concern on the part of others.'

impairment is the sole focus of analysis…' and 'in the absence of other socially sanctioned identities…' He quotes from Morris, 1991[161]: 'The messages we receive are very strong and clear and we have little access to different values which may place a more positive value on our bodies, ourselves and our lives. Our self image is thus dominated by non-disabled world's reaction to us'

Charities could be accused as being a main culprit, using images of vulnerable looking disabled children and adults in order to stir the pathos of potential donors. Institutions were named 'The Putney Home for Incurables' and associations: The Spastics Society.

The image of disabled people presented to society is changing. The charity 'Mind' championed a photograph of an ordinary-looking, affable young man in their promotional literature and 'Scope' became the more forward looking substitute for The Spastics Society.

Organisations are restructuring to move from an organisation which does things 'for' disabled people to one run by disabled people and for disabled people. The British Council of Organisations of Disabled People (BCODP)[162], an umbrella organisation

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Shakespeare, T. 'Disability, Identity & Difference' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p100

[161] 'The messages we receive are very strong and clear and we have little access to different values which may place a more positive value on our bodies, ourselves and our lives. Our self image is thus dominated by non-disabled world's reaction to us' Morris, J. (1991, p28) quoted *in* Shakespeare, T. 'Disability, Identity & Difference' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p102

[162] '…not only to respond to measures proposed by able-bodied people, and established authorities, but to develop the active involvement of disabled people themselves in all areas of service provision, in re-planning for social change which meets the needs of all the members of our communities to participate fully in the mainstream of social activity, e.g. Employment, education, housing, transport, leisure, etc.' The British Council of Organisations of Disabled People (BCODP) Information Pack, p1

representing other organisations is controlled by disabled people and works to 'develop the active involvement of disabled people themselves'.

9.13.2.4 Disability as a collective political identity

Campbell & Oliver, 1996, (quoted *in* Oliver, Ibid.)[163] suggest that '...single impairment organisations have failed to provide an adequate basis for collective self-organisation amongst disabled people in the past.' By concentrating 'on particular groups of people with impairments - for example 'the blind' or 'epileptics'. Here we see the denial of the common social experiences which unite disabled people, and a focus on medical dimensions of difference.' Shakespeare (Ibid.) [164]

If the experience of disability has been given negative connotations, then where a person has an ambiguous appearance or hidden disability, there is little surprise that their disability might be denied or described differently. However, when the notion of disability was understood to be something other than negative then it has some collective bargaining power:

> 'The disability movement provides the collective context for political identification; it involves processes which challenge views of disabled people as incapable, powerless and passive; and it establishes disabled people as the experts on disability and disabled people's definitions as the most appropriate

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[163] '...single impairment organisations have failed to provide an adequate basis for collective self-organisation amongst disabled people in the past.'
Campbell & Oliver, M. (1996) *quoted in* Oliver, M. 'Defining Impairment & Disability: Issues at Stake' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p51

[164] 'Often, this approach does not identify 'the disabled' as such, but focuses on particular groups of people with impairments - for example 'the blind' or 'epileptics'. Here we see the denial of the common social experiences which unite disabled people, and a focus on medical dimensions of difference.'
Shakespeare, T. 'Disability, Identity & Difference' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p95-6

to disability, rather than the traditional domination of professionals.'
(Shakespeare, *in* Barnes & Mercer, 1996)[165]

Shakespeare, (*in* Barnes & Mercer, 1996)[166] identifies that from a strategic position the political disability movement has two contradictory roles, 'firstly, demolish the processes which disable; secondly defend disabled people.'

9.13.2.5 Psychological profiles of disabled people

It is not only the perceived understanding of disability per se that influences people's willingness to be identified as disabled, but when and how their lives are affected. According to Shakespeare (Ibid.)[167] 'some impairments - the congenital impairments for example, or those associated with accident or with early onset - are more likely than others to lead to individuals identifying collectively and socially as disabled.'

From a different source, groups of psychological profiles have been identified. Johnston and Barber (1996)[168] carried out a consumer survey into disability products,

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[165] 'The disability movement provides the collective context for political identification; it involves processes which challenge views of disabled people as incapable, powerless and passive; and it establishes disabled people as the experts on disability and disabled people's definitions as the most appropriate to disability, rather than the traditional domination of professionals.'
Shakespeare, T. 'Disability, Identity & Difference' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p102

[166] 'There are in fact two, contradictory goals of disability politics: firstly, demolish the processes which disable; secondly defend disabled people.'
Shakespeare, T. 'Disability, Identity & Difference' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p107

[167] 'Some impairments - the congenital impairments for example, or those associated with accident or with early onset - are more likely than others to lead to individuals identifying collectively and socially as disabled.'
Shakespeare, T. 'Disability, Identity & Difference' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p105-6

[168] 'Disability products, unlike consumer products for general use, are not designed and sold using sophisticated marketing strategies based on psychological theories of

which identified 'variations among disabled people'. Using cluster analysis, five discrete consumer profiles were established. Each group had a different outlook regarding disability.

Social class is one of the variants said to influence a person's experience of disability. Shakespeare (1996)[169] says of class, '...it qualifies and changes the consequences of impairment, and reduces the exposure to oppressive social relations.'

9.13.3 Disability and design: Rights

9.13.3.1 User friendly design

In America the Americans with Disabilities Act was passed through the senate, backed by the American Constitutional rights at the beginning of the nineties. Already there is a mandate to ensure that design for people with mental health problems be 'user friendly'. (Bilbrey, 1994)[170]

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motivation. Application of psychological and social theories to products whose function is to enable independent living, reveal that they are more likely to be designed for the disability than the person who uses them...'

'...psychographics to produce consumer profiles... A survey of 600 adults with physical disabilities was conducted to establish variations among disabled people. It revealed five distinct consumer groups and opens the possibilities of products being designed with appropriate focus on the psychological needs of the user.'
Johnston, M. & Barber, J. (1996) A Qualitative Design Tool to Improve Equipment for Physically Disabled People, The London Institute, Central St Martins. An abstract for paper presented at a conference: Three Dimensional Design - Past Present and Future, at the University of Wolverhampton, 16.12.1996

[169] 'Class is a particularly powerful determinant of the disability experience. It qualifies and changes the consequences of impairment, and reduces the exposure to oppressive social relations.'
Shakespeare, T. 'Disability, Identity & Difference' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p109

[170] 'The history of our company (Weiland Furniture) goes back to a mandate given to the mental health authorities to design more user-friendly ambience for the benefit of those

9.13.3.2 Disability Discrimination Act, 1996

Design could be seen to discriminate in the eyes of the Law. The Disability Discrimination Act details three areas of discrimination and design could be seen to cause two; 'Directly discriminating', by using poorly defined criteria that allow people with impairments to be considered less than equal, and 'unequal burdens' through a lack of consideration. (Bynoe, Barnes et al. 1991/2)[171]

Gilgist (1995)[172] expressed anxieties for environmental designers, that their task would be more difficult anticipating '...more detailed interiors briefs and tighter budgets' by the implementation of the Disability Discrimination Act.

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suffering from mental illness.' Letter to the author from Daniel G. Bildrey, International Sales Manager for Weiland Furniture, Grabill, Indiana, USA.,5.4.94.

[171] 'Direct discrimination, which means treating people less favourably than others because of their disability.
Indirect discrimination, which means imposing a requirement or condition on a job, facility or service which makes it harder for disabled people to gain access to it.
Unequal burdens, which means failing to take reasonable steps to remove barriers in the social environment that prevent disabled people participating equally.

This type of discrimination exists when an artificial barrier, which could be removed by reasonable adaptation, prevents a disabled person from benefiting from an opportunity enjoyed by a non-disabled person.

In the case of unequal burdens discrimination, the employer or service provider is committing an offence if they fail to adapt the environment to take account of an impaired person's incapacity when it would be reasonable for them to do so.'
Bynoe, I. (1991) The case for Anti-discrimination Legislation *in* Bynoe, I., Barnes, C. et al. (1991) Equal Rights for Disabled People, London: Institute for Public Policy Research,

[172] 'Designers could face more detailed interiors briefs and tighter budgets if the Governments' Disability Bill comes into effect.
The Bill was published last week (1995) and still has to go through the parliamentary process, but the Department of Social Security which put it together, anticipates its broad principles will be implemented by next year.'

9.13.3.3 External barriers in the environment

Crow, (*in* Barnes & Mercer, 1996)[173] describes how an individual can be affected by unusual activities or unadapted environments contrasting with their abilities in familiar surroundings or everyday actions. Carver and Rodda (1978)[174] use medical model terminology to present an example of how a disabled person can be independent and able within certain environments.

9.13.4 Conclusions drawn from disability debate

Design that caters for any area of disability should be aware of the 'inter-related elements' that span both the social and individual models:

'• The physical, mental or sensory impairment of an individual.

• The social environment, artificial barriers and attitudes which prevent the individual from playing a full part in the life of the community.'

Bynoe, Barnes et al. (1991/2)

Gilgist, A. (1995) Design Week, News: Disability Bill News, vol.10, no.3, p3

[173] '...disability can dramatically ease or worsen with changes to an individual's environment or activities even when their particular impairment is static. Leaving a purpose-built home to go on holiday, for example, may give rise to a range of access restrictions no usually encountered, even though an individual's impairments remains the same. Equally, an employee with an impairment may find their capacity to succeed at work is confounded within one organisation but fully possible in another simply because of differences in the organisations' equality practices.'
Crow, L., 'Including all of our lives' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p68

[174] 'A severely crippled person may have a medically incurable condition and may be properly defined as severely disabled. Nevertheless, by providing him with an appropriate wheelchair, and adapting his house so that he can undertake normal functions of caring for himself or for others he may exhibit no social needs in the home environment..'
Carver & Rodda, (1978) Disability and the Environment, Southampton: Camelot Press, p1-11, p103-115

Crow, (*in* Barnes & Mercer, 1996)[175] sees that 'social change - removal of disabling barriers - is the solution to the disadvantages we (disabled people) experience.'
Design is an essential part in this social change.
Considering, again, Oliver's (*in* Barnes & Mercer, 1996)[176] quote from the DPI (1994) schema. Design can strive to be 'barrier free', preventing users having to 'overcome' its inaccessible areas. So commissioned and aware of disability issues, designers with appropriate knowledge can 'eliminate, reduce or compensate for these barriers'.

Design could be seen to perpetuate the individual model of disability. Designers have observed precise characteristics of the product user when compiling criteria needed to design products, particularly functional products. However, functional requirements form only part of a product's development.

A contemporary understanding is required with design and disability. A product or environment must meet with expectations drawn from experience, ensuring that it does not obstruct, or risk discrimination, that it is practicable, and serves to be 'user friendly' but meets with expectations drawn from experiences:

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[175] '...impairment is the functional limitation(s) which affects a person's body, disability is the loss or limitation of opportunities resulting from direct and indirect discrimination. Social change - the removal of disabling barriers - is the solution to the disadvantages we experience.'
Crow, L., 'Including all of our lives' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p57

[176] 'A Disabled Person is an individual in their own right, placed in a disabling situation, brought about by environmental, economic and social barriers that the person, because of their impairment(s), cannot overcome in the same way as other citizens. These barriers are all too often reinforced by the marginalising attitudes of society. It is up to society to eliminate, reduce or compensate for these barriers in order to enable each individual to enjoy full citizenship, respecting the rights and duties of each individual...' quote from the DPI (1994) *in*
Oliver, M. 'Defining Impairment & Disability: Issues at Stake' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p47

'External disabling barriers may create social and economic disadvantage but our subjective experience of our bodies is also an integral part of our everyday reality.' (Crow, *in* Barnes & Mercer, 1996)[177]

'The personal interpretation incorporates any meaning that impairment holds for an individual (i.e. any effects it has on their activities), the feelings it produces (e.g. pain) and any concerns the individual might have (e.g. how their impairment might progress)' (Crow, *in* Barnes & Mercer, 1996)[178]

'Disability is about the reaction and impact of the outside world on our particular bodies.' (Crow, Ibid.)[179]

9.14 Conclusion of contextual research

The historical and political contexts are fascinating and are in themselves disciplines for study. However, for a designer progress is made and problems are solved through design.

The benefit of suspending design activity by limiting and piecing together an understanding of the context is that the development process is equipped with suitable

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[177] 'External disabling barriers may create social and economic disadvantage but our subjective experience of our bodies is also an integral part of our everyday reality.'
Crow, L. 'Including all of our lives' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p59

[178] 'The personal interpretation incorporates any meaning that impairment holds for an individual (i.e. any effects it has on their activities), the feelings it produces (e.g. pain) and any concerns the individual might have (e.g. how their impairment might progress)
Crow, L. 'Including all of our lives' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p61

[179] 'Disability is about the reaction and impact of the outside world on our particular bodies.'
Crow, L. 'Including all of our lives' *in* Barnes, C. & Mercer, G. (1996) Exploring the Divide: Illness and Disability, Leeds: The Disability Press, p67

beginnings and concepts. Actually making sense of an anecdotal response to a request for directions: 'If you want to get to Kilkenny, then I wouldn't go from here'. In some instances the better way to proceed is to re-construct the foundations before doing any building work.

9.14.1 Design & disability mission statement - postulate (2)

Disability products can be designed to suit disabled people:

> Products can be designed which physically disabled people can make full use of and that they do not need to make adaptations in order to use them. The user should not have to compensate for inappropriate design, so saving time, energy and effort. Products can be desirable and provide sufficient choice to reflect the user's taste. Products can be designed for the consumer disability market.

9.14.2 Why use a case study?

A case study is used as a vehicle to demonstrate a tangible response to the criteria above. New understandings are provoked by the specific study and these compared and contrasted against the more general backdrop of the contextual research.

10 SECTION TWO - Design research to illuminate the case study

10.1 Introduction to SECTION TWO

Chapters 11 & 12, contain the specific information necessary to design seating for young adults with arthritis - an identified need for seating that appeals to younger people and takes into consideration the broad psychological, aesthetic needs and desires of individual users.

Secondary research includes information on arthritis, seating, seating recommendations, visual references of domestic seating, contract/office seating, interior finishes and a sample of currently marketed disability products (technically these images should be footnoted, as any text used as a reference would be, but this was not practical). Primary research involved a survey of the sort of seating that younger people with arthritis have, need and desire, valuing the recommendations made by disabled product users.

The design process involved the definition of the design specifications, collation of the information necessary to solve design problems and development of a seat, footrest & cabinet from initial drawings to full sized prototypes.

10.1.1 Problem statement

Seating, such as armchairs - fire side chairs, arm chairs from three piece suites or settees, couches and chaise lounges, have a place in our domestic landscape. They play a part in our contemporary life, being used whilst watching television, during conversation, reading a book or eating a meal.

Despite our close proximity to this furniture, it is not always primarily designed for the sitter's comfort. Or it may be designed to project a notion of comfort, i.e. deep seat, soft upholstery into which the sitter sinks, which does not feel as good as it looks. The greater the sitter's need for comfort, support and a good posture, the more important that the seating criteria are considered.

At a series of short courses, where all of the attendees had arthritis, it was observed that seating was such a vital part of people's ability to settle, concentrate and join in. All sorts of props were being used to compensate for the standard conference chairs: pillows, other chairs for footrests and coats jammed into gaps for extra cushioning.

This demonstrated the importance of seating. Motivated by these real needs a very specific case study, of domestic seating suitable for younger people with arthritis within the context of designing disability products, was pursued.

10.1.2 Seating for younger people & a contemporary aesthetic

There are many seats on the market and many '...claim to be specifically designed for the arthritic and elderly person' (Ellis & Munton, no date given)[180] but few seats are marketed towards younger people with arthritis. This absence of product range compounds the myth that arthritis only affects older people. Only identified one seat aimed at a younger market was identified, it is called the Young Chair, designed by the Danish designer Flemming Hvidt.

The YAC's definition of 'younger', i.e. under 45 years was used here, otherwise the exact age of the sitter has little significance for the project.

10.1.2.1 Seating needs of younger people - postulate (3)

The needs of younger and older people with arthritis are considerably different:

- older people spend more of their day wanting to snooze and much of the design emphasis would be concentrated on assisting people in and out of their chair.

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[180] Many seats on the market:
'There are literally 1000's of easy chairs on the market today and many claim to be specifically designed for the arthritic and elderly person.'
Ellis, M. & Munton, J. (no date of publication given) Are you sitting comfortably? Arthritis & Rheumatism Research Council, p3

- younger people spend more of their day awake and need provisions made for their seated activities and need less assistance in rising and lowering onto their chair.
- the interrelationship of the sitter, chair, accessory furniture and activities done whilst seated will be the main area for development.
- younger people want a more bold and contemporary aesthetics, allowing for free and creative product identity.

10.1.3 Specifying an appropriate product

Referring to the contextual research on disability products, the design's aesthetic qualities should be considered in parallel to its functional details so as to produce an appropriate product. Thus avoiding abstraction of the functional elements which could lead to the product looking extraordinary and unfamiliar.

The design should be practicable but 'user friendly' accurately meet the needs of the user and their expectations.

To evaluate the effectiveness of the design, thus verifying the criteria applied, a prototype should be made and tested with product users.

10.1.4 Research to establish criteria & inform design process

More specific information was needed before beginning to design the seating. It was necessary to gain an understanding of:

arthritis

- when, how and where it affects people
- the number of people affected
- how it affects mobility
- people's experience with arthritis
- how it is treated

seating

- cultural importance of sitting

- what happens to the body when seated
- what is a comfortable seat
- seating recommendations
- activities done whilst seated
- visual references of seating and associated furniture
- people's domestic seating
- people's seating preferences
- how to test the comfort of a seat

This information was sought from a range of material: secondary references from literary sources; conferences; seminars; visual and audio visual information; or from primary sources, i.e. original studies such as surveys and interviews.

10.2 Secondary research: Arthritis

Arthritis is the generic name given to a several painful inflammatory joint diseases. These conditions can centre around one or more joints affecting mobility, reduce energy levels and they are sometimes linked to other conditions.

Rheumatoid Arthritis: '...can affect anyone, *at any age*, but most often begins in young or middle aged women... There are various effective treatments, but no cure. Different individuals need and respond differently to the various therapies available.' (ARC no date given)[181]

It '... rarely kills. Yet it interferes grossly with living a full and social life, with wage earning and with domestic and child-rearing activities. The problem is exacerbated by the fact that, besides being chronic, the condition is fluctuant so that the patient may make an adaption to his illness only to find that its pattern has changed.'

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[181] Arthritis & Rheumatism Research Council (no date of publication given) Rheumatoid Arthritis: A Handbook for Patients, Self help leaflet, designed by Greenleaf & printed by Brown & Son (Ringwood) Ltd., p2

(Chamberlain, 1980) [182] Interestingly, Sir Angus Ogilvy, Patron of Arthritis Care, states that arthritis '...can most certainly lead to premature death.' (1996)[183]

Rheumatoid arthritis is not hereditary but there is a propensity to the condition when triggered by certain, largely unidentified environmental factors. In an attempt to overcome the 'infection' the body's immune system turns on itself - 'many aspects of the inflammatory process itself are important in causing joint damage.' (ARC, no date given)[184]

The lining of the joints, tendons and in time the joint itself are affected. One or more joints can feel hot, swollen, painful and stiff. Depending on how active the disease is, general flu-like symptoms can also persist. 'Flare-ups' are intermittent bouts of illness. Besides the way the condition presents itself the process of the disease can be

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[182] Chamberlain, M.A. (1980) Aids and equipment for the arthritic, The Practitioner UK, vol. 224, Jan., p65-71

[183] Oglivy, A. (1996) Annual Report & Accounts, Arthritis Care, p2

[184] Rheumatoid Arthritis: the cause?
'It is known that certain genetically-controlled chemicals, found on the surface of cells, increase the likelihood of getting rheumatoid arthritis. However, ...it is not a disease that is directly inherited.'
'A second factor likely to be important is a 'trigger substance' capable of starting off the process in those who are susceptible. This may well be a viral or bacterial infection, or the result of an infection. But it has not yet been identified and the disease is not contagious.' p5
'Once the process has started the normal immune defences of the body change. It seems that the inflammation persists because antibodies and immune cells which normally defend against infection, attack the body's own joint tissues.'
'Finally, many aspects of the inflammatory process itself are important in causing joint damage. All these different factors may interact to cause the disease.' p6
Arthritis & Rheumatism Research Council (no date of publication given) Rheumatoid Arthritis: A Handbook for Patients Self help leaflet, designed by Greenleaf and printed by Brown & Son (Ringwood) Ltd., p5 & 6

measured by activity of 'erythrocyte sedimentation rate' (E.S.R.) and 'rheumatoid factor' in the blood (Ibid.)[185]

The most common form of drug treatment is an 'anti-inflammatory' such as aspirin which can 'decrease pain, stiffness, swelling and other consequences of inflammation'. The next line of drug treatment are a more slow acting 'anti-rheumatoid drug' which 'seem to affect the disease process in a more fundamental way'. Gold is one such example. (Ibid.)[186]

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[185] 'In rheumatoid arthritis, synovial tissue lining some of the joints and tendons become chronically inflamed... this inflammation can cause damage to the joints or tendons.
In 'early' rheumatoid arthritis the inflamed joints are swollen, painful and stiff. The stiffness and difficulty of movement arise partly from the pain and partly form the swelling and increase pressure in the joint.'
'Rheumatoid arthritis is a very variable disease. The number and type of joints involved is different in individual patients, and the severity and duration of the inflammation also varies.'
'Inflammation can make you feel ill, cause anaemia and loss of weight. If only one or two joints are involved, and the inflammation is not too active, someone with rheumatoid arthritis may feel quite well. On the other hand widespread or very active disease makes people feel rotten - and can be like having mild flu all the time.'
'Many sufferers experience 'flare-ups' in which inflammation becomes more intense for a few days or weeks, before subsiding again.' p4
'after some months or years characteristic changes at the corner of joints ('erosions') may develop.'
'...The inflammatory activity of the disease can be judged from some of the tests, such as the "erythrocyte sedimentation rate' (E.S.R.)
'Most people with rheumatoid arthritis develop a special antibody in the blood, called 'rheumatoid factor'. The amount of this antibody may give an idea of the severity of the disease and its response to treatment. But it is also sometimes found in normal people unaffected by the disease, and no one knows exactly why or how it develops.' p8/9
Arthritis & Rheumatism Research Council (no date of publication given) Rheumatoid Arthritis: A Handbook for Patients, Self help leaflet, designed by Greenleaf & printed by Brown & Son (Ringwood) Ltd., p4 & p8-9

[186] 'The two main types of drug used in rheumatoid Arthritis are the 'anti-inflammatory' agents and the 'anti-rheumatoid' or 'remission inducing' drugs. Simple painkillers are sometimes helpful and steroids are occasionally used.'

10.2.1.1 Arthritis and age

'Juvenile chronic arthritis' is a term that includes virtually all arthritis affecting children. 'The most common kind, called pauci-articular arthritis, affects a few joints, usually starts at about the age of two or three and continues for several years'. Poly arthritis affects more than one joint and Still's disease is associated with a rash and fever. (Kohner, no date given)[187]

'Anti-inflammatory Drugs: These compounds decrease pain, stiffness, swelling and other consequences of inflammation. They do not stop the disease but the help the symptoms enormously, and they work within a few days. The best known is aspirin. But in order to combat inflammation a rather high dose is necessary and this often causes indigestion and other upsets... There are thirty other drugs of this sort...'p12

'Anti- Rheumatoid Drugs: These, beside helping joint symptoms, also seem to affect the disease process in a more fundamental way. They probably prevent the condition progressing and certainly make many people feel vastly better... Unlike anti-inflammatory drugs theses act more slowly, sometimes taking months to produce benefits. Side-effects are occasionally a problem, but with care and common-sense they can be usually be *minimised* or avoided.'

'Examples of anti-*rheumatoid* drugs: Sulphasalazine, Chloroquine & Hydroxychloroquine, Gold, D Penicillamine, Immunosuppressive drugs, Steroids & Cortisone-like drugs.'

Arthritis & Rheumatism Research Council (no date of publication given) Rheumatoid Arthritis: A Handbook for Patients, Self help leaflet, designed by Greenleaf & printed by Brown & Son (Ringwood) Ltd., p12-14

[187] Childhood Arthritis:

'Most kinds of childhood arthritis come under a general heading of 'juvenile chronic arthritis'. This involves inflammation, pain and swelling in one or more joints. The most common kind, called pauci-articular arthritis, affects a few joints, usually starts at about the age of two or *three* and continues for several years. A child with this sort of arthritis doesn't usually become unwell: the problem is more or less limited to the swollen, painful joints. But eye problems are quite common, and regular eye checks are needed.'

'Polyarthritis, affects many joints. It can start at any age from a few months onwards, and usually spreads from one joint to another quite quickly - within months. Sometimes children with polyarthritis are also generally unwell, with a fever and perhaps a rash.'

p11-12

Less common are juvenile spondylitis, mainly affecting boys' hip, knee and heel joints and psoriatic arthritis which is accompanied by scaly skin. (Ansell, no date given)[188]

'Osteoarthritis is more common in older people, whereas rheumatoid arthritis is commonest among young women 20-50 age group' (ARC, no date given (a))[189] Or 30-50 years, (ARC, no date given (b))[190]

'Stills disease, named after the doctor who first identified it, is the third kind of childhood arthritis. It causes not just inflamed joints but also fever, rashes and other problems. It mainly affects children under five years old.' p12
Kohner, N. (no date of publication given) Information for People with Arthritis, Arthritis Care, self-help leaflet, p11 &12

[188] 'Juvenile spondylitis - this is much less common that any of the types of arthritis already mentioned. It is seen mainly in boys of about nine years and upwards usually affects one or two joints of the legs: hips, knees and ankles being most common. In some children, inflammation occurs where the tendon joins the bones. This is particularly common around the heel.'
'...They *(the person with the condition)* usually carry a special genetic factor (called HLA-B27) and some members of their family have ankylosing spondylitis, spinal stiffness or eye problems.' p6-7
'Psoriatic Arthritis - Psoriasis is a scaling skin disease which can occur with arthritis. It is more common in adults, but it can occur in children, particularly those aged about nine or ten years. The joints may be affected first; which ones and how they behave will suggest a diagnosis. The fingernails and toe-nails are sometimes affected before the skin. Usually the illness is mild, affecting one or two joints, but it may well be recurrent.' p8
Ansell, B. (no date of publication given) When your child has Arthritis, Arthritis & Rheumatism Council, p6-8

[189] '...Arthritis affects people of all ages, including children. Osteoarthritis is more common in older people, whereas rheumatoid arthritis is commonest among women in the 20-50 age group.'
Arthritis & Rheumatism Research Council (no date of publication given) Osteoporosis and Arthritis: Some questions answered, self help leaflet

[190] 'women aged 30-50 are most liable to get rheumatoid. If several members of the family have the disease you are slightly more at risk...'

10.2.1.2 Statistics of people with arthritis

In Britain, 20 million people of all ages are affected by arthritis or rheumatism. 'In the UK as many as 2-3 out of every 100 people may have some evidence of the disease (rheumatoid arthritis).' (ARC, no date given)[191] Barlow, Macey et al., (1993)[192] state that: 'Millions of people are affected by a form of arthritis at some point in their lives.'

In a report from The Royal College of Physicians Committee arthritis is identified as being the 'biggest single cause of physical disability, accounting for about a third of the total of physically disabled people. The proportion rises to almost one half of the people over retirement age.' (RCPC, 1988, *in* Holroyd, 1992)[193]

Arthritis & Rheumatism Research Council (no date of publication given) Rheumatoid Arthritis: A Handbook for Patients Self help leaflet, designed by Greenleaf & printed by Brown & Son (Ringwood) Ltd., p7

[191] 'Rheumatoid arthritis is a common disease in all parts of the world, although severe disease may be more frequent in Northern Europe than in most other areas.'
'In the UK as many as 2-3 out of every 100 people may have some evidence of the disease (rheumatoid arthritis). But many cases are so mild as to be virtually no problem. Only about 1 in 200 women and 1 in 600 men are significantly affected... It can affect any body for childhood to old age,'
Arthritis & Rheumatism Research Council (no date of publication given) Rheumatoid Arthritis: A Handbook for Patients, Self help leaflet, designed by Greenleaf & printed by Brown & Son (Ringwood) Ltd., p6

[192] Barlow, J.H., Macey, S.J. et al. (1993) Health locus of control, self help...

[193] The Royal College of Physicians Committee (1988) Rheumatology Commission Report, *in* Holroyd, J. (1992) Arthritis at Your Age? Suffolk: Grindle Press

Young Arthritis Care approximates that, in this country, 15,000 children have some form of arthritis: 'one in every twenty people aged 16-44'. (YAC, no date given)[194]

'Out of every 100 people who get rheumatoid arthritis, about 30 recover almost completely within a few years; and about 60 continue to have 'flare-ups' of the disease, with some pain and difficulty and a certain amount of joint damage. In about 10 out of the 100, the disease becomes severe and eventually causes disability.' (ARC, no date given)[195]

Arthritis Care has 70,000 members and publication subscriber, which will include interest groups such as paramedics.

The Arthritis Foundation is an organisation in the USA. Robert Meenan, their public health task force chairman estimates that '20 per cent of the population will have arthritis by 2020.' (Denham, 1999)[196]

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[194] 'In this country, arthritis and rheumatism affect: 15,000 children and one in every twenty people aged 16-44'. Young Arthritis Care (no date of publication given) Young Arthritis Care, self-help leaflet.

[195] Reaction to the Disease
"Out of every 100 people who get rheumatoid arthritis, about 30 recover almost completely with in a few years; and about 60 continue to have 'flare-ups' of the disease, with some pain and difficulty and a certain amount of joint damage. In about 10 out of the 100, the disease becomes severe and eventually causes disability." *(A graph containing the same break down of figures states that 5,30 and 65 people out of a hundred will experience the above. taken from* Arthritis & Rheumatism Research Council (no date of publication given) Rheumatoid Arthritis: A Handbook for Patients Self help leaflet, designed by Greenleaf & printed by Brown & Son (Ringwood) Ltd., p6) Kohner, N. (no date of publication given) Information for People with Arthritis Arthritis Care, self-help leaflet, p7

[196] 'In the USA) Its estimated that 20 per cent of the population will have arthritis by 2020.'. Denham, C. (1999) Arthritis Care, Bigger & Better, vol. 82, Feb/March 1992, p12

10.2.1.3 Statistics on disabled people

Barnes & Mercer, (1996)[197] quote the following statistics on the number of disabled people: '...four out of ten adults had a 'long standing illness or disability' (CSO, 1996). Internationally, there are around 50 million disabled people in Europe (Daunt, 1991) and approximately 500 million world-wide (DPI, 1992)'

Torrens, (1994)[198] uses percentages to explain that there are '...between 6% and 11% of the United Kingdom population and between 9% and 13% of twelve other European countries' population are disabled in some way.'

10.2.1.4 Effect on arthritis & mobility

Arthritis causes 'flare-ups' and during these phases rest is 'one of the best treatments for inflammation and joint damage... However, too much rest may allow joints to stiffen and muscles to become weak...' (ARC, no date given)[199], (Ansell, no date given)[200] & (Ellis & Munton, no date given) [201]

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[197] 'In the 1980's, Government social survey figures suggested that 6.5 million people had at least one 'disability' (Martin, Metzler & Elliot, 1988). A more recent study concludes that four out of ten adults had a 'long standing illness or disability' (CSO, 1996). Internationally, there are around 50 million disabled people in Europe (Daunt, 1991) and approximately 500 million world-wide (DPI, 1992)'p1
'...the combination of an ageing population and new medical interventions which prolong life will ensure that the number of people with an 'impairment' or 'chronic illness' will increase substantially over the next few years. The economic, political, and social implication will be far-ranging (Hill, 1993)' p1
Barnes, C. & Mercer, G. (1996) Exploring the divide: Illness and Disability, Leeds: The Disability Press, Chpt.1, p1

[198]Torrens, G. (1994) Proceedings: A discussion of research and development methods through to a commercial conclusion, Conference of the European Academy of design, Designing for physical disability, December 17, 1994, University of Salford, p1

[199] Rest for Rheumatoid Arthritis
'Rest: One of the best treatments for inflammation and joint damage is rest... However, too much rest may allow joints to stiffen and muscles to become weak...'

Subsequent stiffened joints caused by arthritis can reduce people's mobility and this is compounded by lack of exercise and movement. (Spenser *in* Coleman,1993)[202]

An attempt can be made to alleviate this situation through exercise, it 'protects against joint damage, keeps joints and muscles working and helps prevent disability.'
(Arthritis Care, no date given)[203]

'Very bad flare-ups are sometimes best treated by complete-bed-rest at home or in hospital for a few days. Single inflamed joints can be rested in splints. A period of repose during the day, and care and respect for your joints, are also helpful.'
Arthritis & Rheumatism Research Council (no date of publication given) Rheumatoid Arthritis: A Handbook for Patients, Self help leaflet, designed by Greenleaf & printed by Brown & Son (Ringwood) Ltd., p9 & 10

[200] Rest and stiffness:
'There is no good evidence that prolonged rest in bed helps this disease *(arthritis)*. Indeed there are some dangers of a child curling up in bed with his *(or her)* joints in a bad position...'
Ansell, B. (no date of publication given) When your child has Arthritis, Arthritis and Rheumatism Council p14-5

[201] Reduced mobility could cause people to become chair bound:
'Many people with arthritis cannot move about very easily and so spend a lot of time in their easy chairs. Lack of exercise can course the muscles to become weaker and make it *even harder* to get up. In fact, for some people it can be such an effort to get out of a chair or so painful, that they just give up and become chair bound.'
Ellis, M. & Munton, J. (no date of publication given) Are you sitting comfortably? Arthritis & Rheumatism Research Council

[202] Fitness from function:
'Each faculty acquires fitness from its function by performing its function; if its function is performed for it by a substitute agency, none of the required adjustments of nature takes place, but nature becomes deformed to fit the artificial arrangements instead of the natural arrangements.'
Spenser, H. philosopher quoted *in* Coleman, R (1993) write up promoting 'Design Age' at the Royal College of Art, London

[203] Therapeutic Exercise Prevents deformity

Exercise can be a key element in a rehabilitation programme. (WHO, 1980)[204] Therapeutic exercise for people with arthritis include: 'Range of movement (ROM) or Stretching exercises, strengthening exercises and endurance exercises. A good exercise programme will include all three types of exercise.' (Arthritis Care, no date given)[205] When joints are painful, exercising in water is recommended. (Ibid.)[206]

"Exercise protects against joint damage, keeps joints and muscles working and helps prevent disability... Unexercised *(sic)* joints lose muscle, stretch and can become unstable and painful... exercise is a way you can prevent loss of joint function."
Arthritis Care: Daily Living (no date of publication given) Keeping on the Move, Self help leaflet.

[204]Rehabilitation
'...a goal-oriented and time-limited process aimed at enabling an impaired person to reach an optimum level thus providing her or him with the tools to change her or his own life.'
'A4.1 Rehabilitation, as opposed to care and support, is a dynamic process aiming to leave the individual in a better situation after intervention, more independent, more freedoms. It is:

- a practical, problem solving process
- aimed to minimise handicap and disability
- aimed to maximise patient's control over their environment
- aimed with patient's active participation towards the patient's life goals
- limited by the nature and extent of the summated pathology, prognosis and environment.'

World Health Organisation (1980) in Chamberlain, M.A. et al. (1993) An assessment of Health and related needs of physically Handicapped Young Adults.

[205] Therapeutic exercise:
Stretching exercises:
'Range of movement or stretching exercises move your joints through their full range of movement and then coax them just a little further without being over zealous. The purpose of these exercises is to maintain joint mobility.'
'Ideally they should be performed three to ten times a session, twice a day depending on pain. Even inflamed and painful joints should be gently moved through their range of movement twice a day. Many people find that their joint range is not only maintained but improved over a period of time.'
Arthritis Care: Daily Living (no date of publication given) Keeping on the Move, Self help leaflet.

10.2.2 Seating

10.2.2.1 Meaning conveyed by seating?

Seating has social and cultural meaning, for instance the position of power associated with sitting on a throne. In Japanese culture '...anyone who passes through the room without sitting down does not 'enter the room' socially at all.' (Locke, 1992)[207]

Endurance exercises:
'There are more active forms of exercises, such as running, walking, swimming and cycling and will help to increase your overall health, maintain a strong heart, increase the strength of your bone and reduce fatigue.'
'Not everyone with arthritis can run, swim, cycle, however almost everyone can do some endurance exercise. It can be any exercise that cause you to breathe a little faster and increase your heart rate. Aim to exercise for twenty minutes, two to three times a week.'
Arthritis Care: Daily Living (no date of publication given) Keeping on the Move, Self help leaflet.

Strengthening exercises:
'These are useful when you have lost strength in particular joints. They involve contracting the muscles around the affected joint without moving the joint itself.'
'When you start you may find you can only do these once a day and only contract for one or two seconds. Gradually increase as you are able. Try to hold a count of six seconds, then relax and repeat four times, twice a day.'
'The purpose of strengthening exercises is to increase the strength of the muscles which support and protect you joints. Theses exercises are not a substitute for stretching exercises and they will not increase the range of movement.'
Arthritis Care: Daily Living (no date of publication given) Keeping on the Move, Self help leaflet.

[206] Therapeutic Exercise in Water:
'it is easier to exercise in water that on dry land. The water helps to take the weight of the body and you can find you can do more with less pain.'
Arthritis Care: Daily Living (no date of publication given) Keeping on the Move, Self help leaflet.

[207] 'Japanese social Sitting:
People sit on the floor, on mats or cushions. So strong is the connection between sitting and the act of being together, that anyone who passes through the room without sitting down does not 'enter the room' socially at all. They need only to be acknowledged as

10.2.2.2 How body is effected when it is seated

Sitting is an economic posture, reducing the numbers of muscles needing to work to support the body and the necessary associated 'static work load'. (Grandjean, 1973 *in* Oborne, 1982)[208] Sitting also reduces the amount of fluid that can accumulate in the tissues of the legs. (Ibid.)[209]

Oborne (1982)[210] describes the spine, the pelvis and the legs and feet as the 'primary support structures' when sitting. The anatomy of the spine is detailed. (Ibid.)[211]

'present' when they come down to the level at which the room is 'inhabited', that is when they sit down.' p62
Locke, C. (1992) Design Principles & Practice, p62

[208] 'Grandjean (1973) describes sitting down as being a 'natural human posture'. Allowing the operator to sit relieves him of the need to maintain an upright posture, which reduces the overall static muscular workload required to 'lock' the joints of the foot, knee, hip and spine and reduces his energy consumption.'
Oborne, D.J. (1982) Ergonomics at Work, Wiley,p166

[209] 'Grandjean also points out that sitting is better than standing for the circulation. When a person is standing the blood and tissue fluids tend to accumulate in the legs - a tendency which is reduced when seated since the relaxed musculature and the lower hydrostatic pressure in the veins of the legs offer less resistance to the return of blood to the heart.' Oborne, D.J. (1982) Ergonomics at Work, Wiley,p166

[210] 'When seated, the primary support structures of the body are the spine, the pelvis and the legs and feet.'
Oborne, D.J. (1982) Ergonomics at Work, Wiley,p167

[211] 'The Spine consist of 33 vertebrae joined together by multiple ligaments and intervening cartilages... the vertebrae are divided into four areas which correspond roughly to the changes in the shape of the spine. These areas are the top most seven cervical, then 12 thoracic and 5 lumbar vertebrae, followed by 5 fused sacral and four fused coccygeal vertebrae. From the point of view of seating design, the orientation of the lumbar and sacral vertebrae are important, since it is these vertebrae are their respective discs and muscles which take most of the spinal load of a seated person.'
Oborne, D.J. (1982) Ergonomics at Work, Wiley,p167-8

In seating design attempts are made to maintain this shape in order to maximise pressure distributions and reduce back complaints. (Ibid.)[212]

10.2.2.2.1 Pressure sores

In an upright seated position there is considerable pressure being transmitted down the spine, into the lowest part of the seated skeleton: the ischial tuberosities. These bony protuberances can cause pressure sores to people who sit for long periods of time. The skin is starved of a sufficient blood supply and the skin begins degrade, leading to sores. This is not surprising when Dempsey (1963) in Oborne (1982) 'has pointed out that the human body supports approximately 75% of the total body weight on 25 square cm of the ischial tuberosities and the underlying flesh.'

10.2.2.3 Definition of comfort

One of the main aims of this project is to design a comfortable seat that is a satisfying to use. It is not always the case, some seats have been designed as visual expressions, i.e. Mackintosh's upright chairs. (Papenek, 1995)[213]

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[212] 'Since the spine has evolved to this shape, it seems reasonable to suggest this 'natural' shape is one which produces both the optimum pressure distribution over the cervical discs, and the optimum level of static load on the inter vertebral muscles. It follows, therefore, that a seat in which the sitter has to cause mal-distributions in disc pressure will results, *over* time, in lumbar complaints.' Oborne, D.J. (1982) Ergonomics at Work, Wiley,p167-8

[213] 'Some of the decorative upright chairs devised by Charles Rennie Mackintosh around 1900 have been lovingly recreated in Italy. It's fun to speculate on the body build of someone ideally suited to sit in one of these chairs: rather slim, approximately eleven feet tall, but with grotesquely short and bandy legs. Since the seats are flat plain hardwood, it would also help if the user was somewhat steatopygic*, thus providing his or her own upholstery.' p176
Papanek, V. (1995) The Green Imperative: Ecology & Ethics in design & Architecture. London: Thames & Hudson, p176

('*Steatopygic-an accumulation of fat on the buttocks' Schwatz, C. (Ed.)(1992) Chambers Maxi Paperback Dictionary, W.R. Chambers Ltd. Edinburgh, p1067)

So what are comfort and satisfaction?

- To be satisfied a persons' requirements are met, they are content and gratified. (Schawrz,1992)[214]
- Comfort is described as 'n. relief… ease, a degree of luxury; freedom from annoyance; whatever gives ease …enjoyment … a subject of satisfaction.' (Ibid.)[215]

The furniture designer Stumpf (1987)[216], described it as 'a feature of civility', 'an absence of irritation. Comfort reigns when you can take the infrastructure for granted; when it does not press itself upon you.' In studies of seating, to be able to discuss sensations arising form postures, comfort is described as avoiding discomfort.

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[214] 'Satisfy- vt. …to fulfil the conditions of; to meet the requirements of; to content; … n. satisfaction the act of satisfying; the state of being satisfied, content; …gratification; comfort; something which satisfies…'
Schawrz, C. (1992) Chambers Maxi Paperback Dictionary, Edinburgh: W & R Chambers, p962

[215] 'Comfort - vt. to relieve from pain or distress; to soothe, cheer, console.- n. relief; encouragement; ease, a degree of luxury; freedom from annoyance; whatever gives ease, consolation, enjoyment, etc..; a subject of satisfaction. - adj. comfortable imparting or enjoying comfort; easy (fig); having enough money to live.'
Schawrz, C. (1992) Chambers Maxi Paperback Dictionary, Edinburgh: W & R Chambers, p207

[216] '…comfort was a feature of civility and he defined comfort as an absence of irritation. Comfort reigns when you can take the infrastructure for granted; when it does not press itself upon you.' Stumpf, (jointly designed Aerron for Herman Miller) 'Are Metaphors enough to keep you warm on a cold winter's night?' lecture given at Icongrado ICSID/IFI Congress on design, Amsterdam, July 1989 'Stumpf was concerned that a focus on visual imagery and metaphors can undermine functionality.': in Dormer, P. (1990) The Meanings of Modern Design, London: Thames & Hudson, p115

Shackel, Chidsey, et al. (1969)[217] reiterate this. Oborne (1982)[218] writes of Branton's study in 1972, an ideal state of comfort is an absence of awareness of posture, whereby the sitter can give 'undivided attention to whatever activities he may wish to pursue'.

Shackel, Chidsey, et al. (1969)[219] describe 'the term and concept 'comfort ' is an abstract noun for a personal sensation…' However, in an analysis of industrial comfort 'experienced by passengers in vehicles' it was considered to be '…a result of the summation of sensory stimuli experienced via all sense organs, judged as a totality.' (Manenica & Corlett, 1973, *in* Corlett & Bishop, 1976)[220] It can be thought of as an abstract or a bodily experience.

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[217] '...very little has been done about measuring comfort. Most investigators, ourselves included, have considered chair design as being concerned with the avoidance of discomfort for the majority of users. Hence the concept of comfort is relatively unexplored; nor had the exploration of positive comfort been advanced much by this study.
Shackel, B., Chidsey, K.D. et al. (1969) Ergonomics, The Assessment of Chair Comfort, vol. 12, no.2, p294

[218] '...the definition (comfort) might be better couched in terms of discomfort. As an analogy Branton (1972) uses the definition of health; its is only possible to declare that a person is healthy when he does not have any illness. Branton further suggests that the absence of discomfort does not mean the presence of a positive feeling but merely the presence of no feeling at all. 'There appears to be no continuum of feelings, from maximum pleasure to maximum pain, along which any momentary state of feelings may be placed, but there appears to be a continuum from a point of indifference, or absence of discomfort to another point of tolerance, or unbearable pain'. This argument suggest, therefore, that the ideal seat is one in which a person loses all awareness of his seat and of his posture. When in this state a person is able to give his undivided attention to whatever activities he may wish to pursue.'
Oborne, D.J. (1982) Ergonomics at Work, Wiley,p171

[219]Shackel, B., Chidsey, K.D. et al. (1969) Ergonomics, The Assessment of Chair Comfort, vol. 12, no.2, p303

[220] 'This concept (of industrial comfort) was derived from an earlier study of the comfort experienced by passengers in vehicles (Manenica & Corlett, 1973). This hypothesis that

Shackel, Chidsey, et al. (1969)[221] and Oborne (1982)[222] share the view that comfort is a subjective experience. It is also time dependent. Wilson, (1982)[223] referring to a report, cites that people with osteoarthritic hips or rheumatoid arthritis know within ten minutes whether or not they are comfortable. Results from Shackel, Chidsey et al. (1969)[224] found that seated comfort 'decreases with time'. The sitter can also

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the comfort level experienced would arise as a result of the summation of sensory stimuli experienced via all sense organs, judged as a totality.' p177
Corlett, E.N. & Bishop, R.P.(1976) Ergonomics, A Technique for Assessing Postural Discomfort, vol. 19, no 2, p175-182

[221] '...it was decided that the primary results must be obtained from subjective measurements... in the context of studying chair comfort in relation to individual users choosing for themselves, namely that the ultimate criterion must be the subjective judgement of a representative sample of users.'
Shackel, B., Chidsey, K.D. et al. (1969) Ergonomics, The Assessment of Chair Comfort, vol. 12, no.2, p 274

[222] '...it is extremely difficult to define comfort, primarily because it is an entirely subjective concept...' Oborne, D.J. (1982) Ergonomics at Work, Wiley,p171

[223] 'According to a recent report, if you put people suffering from osteoarthritic hips or rheumatoid arthritis in a chair, within ten minutes you'll know whether they are comfortable or not.
Wilson, D. (1982) In Practice, General Practice, Nov. 5, p22-44 (p43) (No. 10)

[224] 'results:...there is a clear trend for the comfort ratings to decrease with time' Shackel, B., Chidsey, K.D. et al. (1969) Ergonomics, The Assessment of Chair Comfort, vol. 12, no.2, p279

experience ill-effects if sitting for extended periods. (Oborne, 1982)[225] & (Pottier, Dubreuil, & Mond, 1969, *in* Oborne, 1982)[226]

10.2.2.4 Testing for comfort

The only way to test interrelations between seats and accessory furniture is through 'experimental investigation' (Burandt & Grandjean, 1973)[227] Bearing in mind the purpose for which the furniture is designed. (Oborne, 1982)[228]

Testing for comfort involves two fundamental areas: what would be measured & then how to express the degree of comfort?

10.2.2.4.1 Measurement methods for seated comfort

In search of a way to measure comfort Shackel, Chidsey et al. (1969)[229] isolated criteria. Their words, have been grouped and detailed into three main areas:

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[225] '...prolonged sitting may itself cause health problems, for example, Grandjean (1973) points out that a sitting posture causes the abdominal muscles to slacken and curves the spine, in addition to impairing the function of some internal organs - particularly those of digestion and respiration.'
Oborne, D.J. (1982) Ergonomics at Work, Wiley, p166-7

[226] '...Pottier, Dubreuil, and Mond (1969) have demonstrated that prolonged sitting (over 60 minutes) produces swelling in the lower legs of all sitters, which is caused by an increase in hydrostatic pressure in the veins and by compression of the thighs causing an obstruction in the returned blood flow.' Oborne, D.J. (1982) Ergonomics at Work, Wiley, p166-7

[227] '...It is only the experimental investigation that will reveal the effective interrelations between the comfort of seat and table dimensions and anatomical data' in Burandt & Grandjean, (1973) *in* Oborne, D.J. (1982) Ergonomics at Work, Wiley, p166-7

[228] '...a chair which is designed for ease, comfort and long term sitting needs to be assessed according to different criteria than one which is to be used for only a few minutes at a time.'
Oborne, D.J. (1982) Ergonomics at Work, Wiley, p171

[229] 'Measurement methods: Alternatives-

'a. the fit of the chairs to the user's anatomy' -

'1. Anatomical and physiological factors: body size, shape and structure, related orthopaedic aspects and effects of prolonged pressure...'

'b. the user's performance and/or behaviour' -

'2. Observations of body position and movement... number, frequency and other characteristics of movements and changes in posture are the prime variable studied...

3. Observation of task performance...'

'c. the user's subjective assessment, as measured by controlled methods in a controlled situation.'

Branton and Grayson (1967) used the second method, observing train passenger's 'degree of fidgeting' to indicate seat discomfort. (*in* Oborne, 1982)[230]

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1. Anatomical and physiological factors: body size, shape and structure, related orthopaedic aspects and effects of prolonged pressure...

2. Observations of body position and movement... number, frequency and other characteristics of movements and changes in posture are the prime variable studied...

3. Observation of task performance...

4. Subjective methods...' p273-4

'...what is the ultimate criterion for seating comfort, and indeed what is comfort, still seems unanswerable. The three main experimental approaches at present used study: a. the fit of the chairs to the user's anatomy; b. the user's performance and/ or behaviour, and c. the user's subjective assessment, as measured by controlled methods in a controlled situation.'

Shackel, B., Chidsey, K.D. et al. (1969) Ergonomics, The Assessment of Chair Comfort, vol. 12, no.2, p303

[230] '...the degree of fidgeting could act as an indicator of seat discomfort, as was demonstrated by Branton and Grayson (1967). They recorded the changes in sitting posture of 18 subjects during a five hour train journey while sitting in one of two types of seats.'

Oborne, D.J. (1982) Ergonomics at Work, Wiley, p171

Shackel, Chidsey et al. (1969)[231] draw attention to the 'importance of the subjective information'. This can be elicited in a number of ways. Le Carpentier (1969)[232] thought people to be 'more accurate and reliable' using comparisons rather than 'absolute judgements'. Different methods have been explored for rated responses. (Shackel, Chidsey et al., 1969)[233]

10.2.2.4.2 Expressing degrees of comfort & sensation

There have been several seating studies using different descriptors: Allen & Bennett's (1958) methodology for testing comfort (of pilot seats) was to choose 'parts of the body for comfort on a forced-choice procedure'; Corlett & Bishop, (1976)[234]

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[231] 'What we wish to suggest is the importance of the user's subjective assessment, and its essential primacy as the ultimate criterion of comfort against which other more convenient and perhaps more objective methods may be validated.'
Shackel, B., Chidsey, K.D. et al. (1969) Ergonomics, The Assessment of Chair Comfort, vol. 12, no.2, p303

[232] Le Carpentier, E.T. (1969) Ergonomics, Easy Chair Dimensions for Comfort - A Subjective Approach, Vol.12, p329

[233] The available subjective methods are as follows. 1. Rating, on a numerical scale; 2. Rating, with verbal cues; 3. Checklist rating; 4. Absolute rating (using 1-100); 5. pair comparisons; 6. Direct ranking; 7. Forced-choice rating.'
It is not generally sufficient to tell raters that they are to rate their own feelings of comfort or discomfort, without giving them some cues, so as to be sure that different testers give the same rating when experiencing the same amount of discomfort.' Shackel, B., Chidsey, K.D. et al. (1969) Ergonomics, The Assessment of Chair Comfort, vol. 12, no.2, p295 & p294

[234] '...adapting the technique of Allen and Bennett (1958) ...developed to test the comfort of pilots' seats Experienced pilots sat in a variety of seats for given periods of time. During the sitting period they had to rank chosen parts of the body for comfort on a forced-choice procedure. On our case, a pilot experiment asking subjects to rank discomfort on a force-choice procedure was not satisfactory, so a modification of the method was used.
Several numbered diagrams of the body were produced, as in Figure 3, each bearing the numbers on a different order. In 3/4 hour intervals throughout a 3 hour working period, operators were asked to indicate on the diagram the body area, or areas, which were the

adapted this idea, using 'numbered diagrams of the body', 'operators were asked to indicate on the diagram the body area, or areas, which were the most painful' at various intervals. Verbal prompts were used on a 'seven-point scale' to indicate 'levels of overall comfort'; and Shackel, Chidsey et al. (1969)[235] used various measures for assessing seated comfort: a subjective measure using a rating scale, Bennett's body area comfort ranking, a chair feature check list, direct ranking, body posture change frequency and finally chair dimensions and standard recommendations.

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most painful. Having noted these, and covered the areas chosen by small flaps, the next most painful areas were asked for, and so on until no further areas were offered. Prior to this detailed record being taken, the subject was asked for an overall assessment of discomfort. For this a seven-point scale was used, with 'extremely comfortable' and extremely uncomfortable' marked at its left and right-hand ends respectively. The subject was asked to indicate the point on the scale which represented the operator's current level of overall comfort.'

Corlett, E.N. & Bishop, R.P.(1976) Ergonomics, A Technique for Assessing Postural Discomfort, vol. 19, no 2, p178

235 'The measurements methods finally adopted...:

1. General Comfort Rating:

The first subjective measure was aimed to elicit from the subjects, at appropriate intervals during a trial session, a rating of their present sensation on a comfort-discomfort scale.'

2. Body Area Comfort Ranking:

Allen & Bennett (Bennett, 1963) have described a forced-choice ranking techniques for assessing the pattern of local comfort and discomfort whilst sitting, and the technique appeared appropriate for use in this context.

On the answer sheet a mannequin is shown, divided into fifteen body areas each with a reference number on it. Alongside are five boxes, labelled '3 most comfortable' to 'least comfortable'.

3. Chair feature Checklist

4. Direct Ranking

5. Body Posture Change Frequency

6. Chair Dimensions and Standard Recommendations'

Shackel, B., Chidsey, K.D. et al. (1969) Ergonomics, The Assessment of Chair Comfort, vol. 12, no.2, p 274-5

Jones (1969) study used subjective description of sensation from: 'no sensation', 'conscious of contact with the seat', 'numbness', 'ache', and 'pain'. This selection was adapted and included as descriptors for testing the case study prototypes. (*in* Oborne, 1982)[236]

10.2.3 General seating recommendations

Galer (no date noted)[237] confirms that the sitter needs to move and shift their body weight in order to remain comfortable. Branton's idea is that the cyclic movement involved in maintaining comfort is governed by autonomic regulation. So a seat needs to accommodate these intermittent postural changes 'allowing the sitter both stability and flexibility.' (Oborne, 1982)[238]

Where ever possible, accompanying furniture should be designed for the chair and task: the 'seat should always be made in relation to the other equipment used by the sitter and the nature and the task performed.' (Galer, no date noted)[239]

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[236] 'Jones (1969) studied posture and feelings of comfort in a highly adjustable car seat in many different positions. Subjects were trained to recognise their sensation of 'no sensation', 'conscious of contact with the seat', 'numbness', 'ache', and 'pain' after varying intervals. From his data he suggested a backrest angle of 108°'
Oborne, D.J. (1982) Ergonomics at Work, Wiley, p179

[237] 'The human body is not designed to stay in a seated position for long periods of time, and requires occasional relief from this position as well as the freedom to shift position during the time seated.'
Galer, I.A.R. (1987) Applied Ergonomics Handbook, Second Edition, Institute of Consumer Ergonomics, London: Butterworths, p90

[238] 'Branton argues that postural activity falls into the same category of autonomic regulation, and that postural homeostatis is a process by which the sitter strikes a compromise between his needs for both stability and variety. Thus sitting behaviour will be characterised by cycles of both inactivity and activity representing the changing needs for stability and variety. An efficient and comfortable chair, therefore needs to be able to accommodate these homeostatic requirements and allow the sitter both stability and flexibility.' Oborne, D.J. (1982) Ergonomics at Work, Wiley, p173

[239] '...no seat, however carefully designed, can of itself ensure overall comfort and efficiency for long periods of time. This is because the design of the seat should always

10.2.3.1 Recommended seating for a person with arthritis

It is 'essential to have at least one (chair) which is your very own' (Holroyd, 1992)[240] Whilst seated shifting positions can ease stiffness and it can be encouraged with sufficiently sized seat. (Ellis & Munton, no date given)[241] and (Holroyd, 1992)[242] Even whilst relaxing it is important to consider body posture, 'because of the risk that affected joints will stiffen in a position which will ultimately be bad for their function…' 'In some cases 'rest splints may be needed…' Ansell, B. (no date given)[243]

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be made in relation to the other equipment used by the sitter and the nature and the task performed.'
Galer, I.A.R. (1987) Applied Ergonomics Handbook, Second Edition, Institute of Consumer Ergonomics, London: Butterworths, p90

[240] 'essential to have at least one (*chair*) which is your very own, but don't rush into buying one that may be unsuitable consult your Occupational Therapist...'
Holroyd, J. (1992) Arthritis at Your Age? Suffolk: Grindle Press, p163

[241] 'The seat should be roomy enough to allow you to change positions easily.'
'...You must be able to have room to be able to move about. Sitting still for long periods can be very uncomfortable, unnatural and undesirable...'
Ellis, M. & Munton, J. (no date of publication given) Are you sitting comfortably? Arthritis & Rheumatism Research Council, p10 &12

[242] Keep moving to avoid joints becoming stiff:
'Change your position frequently to avoid joint stiffness.'
Holroyd, J. (1992) Arthritis at Your Age? Suffolk: Grindle Press, p163

[243] Posture and rest:
'...Because of the risk that affected joints will stiffen in a position which will ultimately be bad for their function, it is essential that your child maintains a good posture... this includes posture in bed. Your child should lie on a firm mattress, if the neck is affected use only one thin pillow so that the neck is not pushed forward. Rest splints may be needed during sleep or rest periods.'
Ansell, B. (no date of publication given) When your child has Arthritis, Arthritis & Rheumatism Council p14-5

Holroyd, (1992)[244] although advocating shifting positions for comfort, advises not to sit 'with your legs crossed' because it 'encourages joint deformity'.

Different activities, i.e. 'reading, writing, watching television, knitting, eating and dozing' require different body positions. (Ellis & Munton, no date given)[245] Activities also affect the area around the seating. Holroyd, (1992)[246] recommends it is carefully planned, with favourite and frequently used objects close to hand. A description of her seating arrangement illustrates her point, she has a:

> 'Carefully chosen seat; right height (with 'raisers'), firm base and arms from which hang plastic bags of goodies for the current activity (e.g. letter-writing, sewing, armchair shopping). Seat is next to high table topped with magazines, typewriter, etc. 'Clutter' is what some people call it; I prefer 'sanity-savers'! within easy reach are phone, radio, T.V. remote control, footstool, well-positioned light, long reach gadget, and electric socket and curly wurly lead. Seat faces a window so I can enjoy the view.' (Ibid.) p157

For such 'clutter' Ellis & Munton[247] suggests a 'side-pocket attachment', and a 'stick holder or crutch-holder' for some.

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[244] Holroyd, J. (1992) Arthritis at Your Age? Suffolk: Grindle Press, p163

[245] Different postures for different activities:
'You may want to change your position in a chair for reading, writing, watching television, knitting, eating and dozing or the like.'
Ellis, M. & Munton, J. (no date of publication given) Are you sitting comfortably?
Arthritis & Rheumatism Research Council, p12

[246] Consider the space beside the seat:
'Plan the area round your chair so that everything's at hand, e.g. table, phone, light, radio, remote control for T.V., long reach gadget. A book rest on the table might help spare your hands. Some people find a baby's pillow or a butterfly pillow eases neck strain...'
Holroyd, J. (1992) Arthritis at Your Age? Suffolk: Grindle Press, p163

[247] Accessories for a seat:
'A side-pocket attachment... is ideal for holding magazines and other bits and pieces.'

10.2.3.2 Anthropometric & ergonomic seating recommendations

The chair seat should be:

- the right density: a more firm seat is recommended. (Oborne, 1982)[248], (Ellis & Munton, no date given)[249] & (Dreyfuss, 1981)[250]. Avoid soft

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'Some people might find a stick holder or crutch-holder useful.'
Ellis, M. & Munton, J. (no date of publication given) Are you sitting comfortably?
Arthritis & Rheumatism Research Council, p16

[248] 'After analysing the number of 'fidgets' observed in the sitters and the length of time for which stable postures were maintained, the authors were able to state that by almost all counts II (the firmer seat) is much better. Furthermore, not only was the number of different postures greater in II, but more were 'healthy'.' Oborne, D.J. (1982) Ergonomics at Work, Wiley, p179

[249] 'You should look closely at the part of the chair you sit on - the seat itself - to make sure it will give you both support and comfort, and a firm base to push up from. Firstly, the cushion should be made from good quality foam. Most cheaper foams go soft and start sagging within a few months of purchase...' p10
Ellis, M. & Munton, J. (no date of publication given) Are You Sitting Comfortably?, ARC, Chesterfield, Derbyshire

[250] '5. Seat padding
a. Hard flat seats are uncomfortable for periods of over an hour, and cause the sitter to become restless. The pressure on the tissues under the ischia impedes the blood flow, creating fatigue and pain. A slight hollow in the seat 0.5" (1.3cm) deep and contoured to fit the buttocks increases comfort.
b. Deep soft padding allows the ischia to sink too far, and the load is then transferred to the surrounding flesh, creating discomfort. It also rotates the greater trocanters of the thigh bones upward, which causes abnormal tension in the hip muscles.
c. For comfort, an average padded seat would have about 1.5" (3.8cm) of medium foam padding over 0.5" (1.3cm) of firm closed cell padding.
d. Bottoming is experienced when a person sits down hard and feels the seat pad with an abruptness. To prevent bottoming, a firmer pad is installed under the medium foam cushion.
e. The chair seat supports most of the body weight. In a relaxing or lounge chair approximately 75% of the body weight is on the seat. 8% on the back rest and 17% (legs and feet) on the floor.

(Holroyd, 1992)[251] and hammock seats. (Ellis & Munton, no date given)[252] The seat front edge needs to be imperceptible, by padding and use of radii.[253]

- correct in dimension:
    - the right height: Avoid chairs that are too low (Rees, no date given)[254] & (Dreyfuss, 1981)[255] or high. (Dreyfuss, 1981)[256] '...The

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f. The maximum allowable seat compression is about 1.5" (3.8cm) for the average man, who weighs about 172lb (78kg). Deduct 0.25" (.64cm) for every 30lb (13.6kg) lighter, and add 0.25" (.64cm) for every 30lb (13.6kg) heavier.'
Dreyfuss, H. (Assoc.), (1981) Human scale, MIT Press: USA, p20

[251] avoid low seating, its difficult to get out of:
'Avoid low chairs and soft chairs you have to flop into...'
Holroyd, J. (1992) Arthritis at Your Age? Suffolk: Grindle Press, p163

[252] 'Secondly, try to avoid seats that sag like a hammock when you sit in them. This can cause stretching of the skin on your bottom, or it can cause your bottom to press through and rest on the base of the seat; this will almost certainly be uncomfortable. Getting our of a chair with a sagging seat is difficult even for the fittest of us. And a sagging seats often expose the front rail of the seat support, which can dig painfully into the thighs.'p10-11
Ellis, M. & Munton, J. (no date of publication given) Are You Sitting Comfortably?, ARC, Chesterfield, Derbyshire

[253] '6. Seat front edge
a. Hard seat front edge (such as those on deck chairs) compress the tissue hard against the thigh bone and slow down blood circulation in the legs. This compression can cause severe pain or make the legs fall asleep sometimes the feet swell and there is a possibility of venous thrombosis.
b. A softly padded front edge with a radius of about 1-2" (2.5-5.1cm) reduces tissue pressure to near zero. In a good chair the sitter is not conscious of the front edge.'
Dreyfuss, H. (Assoc.), (1981) Human scale, MIT Press: USA, p20

[254] 'Seat too low = thighs unsupported, back rounded. Difficult to get out of.
Seat too high = pressure on back of thighs
Seat too short = pressure on thighs and thighs unsupported.'
Rees, M. (no date of publication given) Better Ways to Choose a Chair, leaflet, Ashley Healthcare Ltd

highest chair you can that allows you to place bare feet flat on the floor' (Ellis & Munton, no date given)[257], but 'allow the legs to be stretched well forward'. (Oborne, 1982)[258] To suit a range of peoples' heights, or a growing person's height adjustable seats are recommended. (Dreyfuss, 1981)[259]

- the right width (Oborne, 1982)[260] & (Dreyfuss, 1981)[261] and length. (Ibid.)[262]

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[255] 'e. Seats lower than 15" (38.1cm) are hard to rise out of, except in cars, where the distance from the car floor to the road may increase the effective seat height...
g. Seats lower than 6" (15.2cm) may over stretch the hamstring muscles when legs are fully extended or tilt the pelvis backward - eliminating the normal lumbar curve.'
Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p19

[256] '3. Seat height/ front edge
a. A seat higher than the distance measured from the popliteal area (under the thigh in the back of the knee) to the bottom of the shoe makes the legs and feet dangle, causing undue pressure on blood vessels and nerves in the thigh.
Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p19

[257] 'Choose the highest chair you can that allows you to place bare feet flat on the floor. This will stop your legs from dangling uncomfortably and cause pins and needles...'
Ellis, M. & Munton, J. (no date of publication given) Are You Sitting Comfortably?, ARC, Chesterfield, Derbyshire p5

[258] 'Seat height: easy chair should allow the legs to be stretched well forward since this is one of the preferred relaxing postures for the feet, in addition to helping to stabilise the body.'
Oborne, D.J. (1982) Ergonomics at Work, Wiley, p175

[259] 'b. The adjustable seat height range is 16.6-20.6" (34.5-52.3cm) for adults...
h. Adjustable or incremental seat sizes are desirable for accommodating children as they grow...'
Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p19

[260] 'Seat width: 43-45cm.'
'Seat depth: easy chair 40-43cm; work chair 35-40 cm.'
'... to ensure that all potential sitters find support in the lumbar area for the back rest.'
Oborne, D.J. (1982) Ergonomics at Work, Wiley, p175

Dreyfuss (1981)[263] recommends that a footrest is a useful device for overcoming a chair that is too tall for the user, that is greater than the 'popliteal height plus heel height'. Ellis & Munton[264], see a foot stool as unnecessary and even hazardous whereas Holroyd (1992)[265] recommends using a 'gout stool' for its therapeutic value.

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[261] '2. Seat width

a. Seat widths less than 16" (40.6cm) do no fully support the buttocks of larger male or female. Seat edges can be disturbing if they are felt.

b. The smallest seat, such as those used on bicycles must support the ischial tuberosities (two protuberances extending down from the pelvic bones.) The reduced seat area increases tissue pressure and discomfort.

c. Seat widths have no maximum based on human requirements.'

Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p19

[262] '1. Seat length

a. Seat lengths less than 13" (33cm) do no give adequate seat support under the thighs, and the load on other tissues is consequently increased. The resulting discomfort is reflected in a shorter sitting time.

b. Seat lengths greater than 16" (40.6cm) do not accommodate the small female. The front edge of the seat comes in contact with the back of the leg forcing her to sit toward the front or to slide forward away from the back rest support, which results in a poor sitting posture.

c. Seat lengths of 18" (45.7cm) provide fuller thigh support for larger people giving them greater comfort.'

Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p19

[263] 'c. A fixed seat height of 17in. (43.3cm) accommodates the largest number of adults, but a 1-2" (2.5-5.1cm) footstool may be necessary for the small female.

d. A 15" (38.1cm) seat height accommodates nearly all adults, but the large male needs space for his extending legs.' p19

'1. Footrest

a. Portable footrest.

If the front edge of the seat exceeds the popliteal height plus heel height, a foot rest is required. This is frequently the case in seating small females.'

Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p22

[264] '...a footstool should not be necessary. These can be dangerous - it is too easy to trip over them or stub you toes on them' p5

Ellis, M. & Munton, J. (no date of publication given) Are You Sitting Comfortably?, ARC, Chesterfield, Derbyshire

It is easier to stand up from a higher chair. (Chamberlain, 1980)[266] and (Ellis & Munton, no date given)[267] There are various techniques for 'getting up' from your seat:

- shuffle forwards on the seat, on edge of the seat position the flat of the hands, rock forwards and build up some momentum, then co-ordinate this with a push from the hands. (Holroyd, 1992)[268]

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[265] 'You'll need good back support and should be able to rest your feet on the floor (or footstool.) Something called a 'gout stool' can be found in some antique shops. It is angled, and can rock backwards and forwards, allowing gentle movement in foot, knee and calf muscles.'
Holroyd, J. (1992) Arthritis at Your Age? Suffolk: Grindle Press, p163

[266] high chair:
'The arthritic frequently has difficulty in raising from low chairs and beds...'

'Frequently a higher armchair such as a Parker Knoll or Shackleton is found more comfortable. An ejector cushion may help those whose knees are involved and who have poor power in the quadriceps.'
Chamberlain, M.A. (1980) Aids and equipment for the arthritic, The Practitioner UK, vol. 224, Jan., p66

[267] 'It is obviously far easier to get out of a high chair than a low one. Many people think they can only be comfortable in a low chair, but this is not necessarily true. A high chair can be just as comfortable and probably more so if you suffer from back pain.' p 4
Choose the highest chair you can that allows you to place your bare feet on the floor.
Ellis, M. & Munton, J. (no date of publication given) Are you sitting comfortably?
Arthritis & Rheumatism Research Council, Chesterfield, Derbyshire p5

[268] 'Techniques for Getting out of a chair, co-ordination of rocking and pushing:
When you get out of a chair, wiggle forwards first, place the flat of your hand over the padded end of your chair to help you push and spread the strain through your forearms and over as many joints as possible. Don't push up with bent fingers as that strains delicate finger joints. Try a rocking movement, so that the weight of your head (about 9lbs) helps move you forward, using the principle of swinging a weight to make it lighter. Avoid twisting as you rise. Special riser chair seats might tempt you. They can be helpful, but do try some out first. Some are a bit too energetic or stiff.'
Holroyd, J. (1992) Arthritis at Your Age? Suffolk: Grindle Press, p163

- tuck the feet back under the seat to help to stay balanced, a seat that stops you doing this is not recommended. (Ellis & Munton, no date given)[269] & (Dreyfuss,1981) [270]
- pushing upwards using the hand grips of the arm rests. (Ellis & Munton, no date given)[271] & (Dreyfuss,1981)[272]

The chair's armrest should be:

- enclosed to provide warmth (Ellis & Munton, no date given)[273]

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[269] Techniques for Getting out of a chair, Positioning the feet:
'The way you get out of a chair makes a big difference. For instance, it is easier if you tuck your feet back underneath you than if you place them out in front. This is because you can bring your own weight over your feet more quickly.'
'...in your researches it is worth ruling out any chair that has no space at the front beneath the seat, or one which had a rail between the legs.'
Ellis, M. & Munton, J. (no date of publication given) Are you sitting comfortably?
Arthritis & Rheumatism Research Council, p8

[270] 'c. A clearance of about 3" (7.6cm) is needed behind the front edge to allow the feet and legs to move back as an assist in rising from the chair.' p20
'4. Knee Angle
a. The optimum comfort range is 95-135°....
d. Knee angles of about 80° are required for placing the feet backward to rise out of a chair. For this reason the chair must be equipped with a set back of at least 3" (7.cm) under the seat.' Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p22

[271] Techniques for Getting out of a chair, Using the Armrests:
'Research has shown that the proper use of armrests can be twice as effective in helping you get up than having a high chair.'
The first point to look for is a good grip. You will find them easier to grip if they ... protrude a few inches. This will allow you to wrap your fingers around the end.' p7
Ellis, M. & Munton, J. (no date of publication given) Are you sitting comfortably? leaflet
Arthritis & Rheumatism Research Council, p7

[272] 'Armrests
1. In addition to supporting the weight of the arms, armrests are useful aids in getting in and out of chairs. They can also act as steady rests for manipulating sensitive controls with the fingers.'
Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p21

- well padded (Ibid.)[274] (Dreyfuss,1981) [275] & (Wilson, 1982)[276]
- detailed with a timber end grip (Ellis & Munton, no date given)[277]
- correct in dimension:
    - the right height (Dreyfuss, 1981)[278]

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[273] Arm rests:

'Armchairs with enclosed sided are usually preferable to open-sided armrests for reasons of warmth.' p8

Ellis, M. & Munton, J. (no date of publication given) Are you sitting comfortably? Arthritis & Rheumatism Research Council, p5, 8 & 16

[274] Padded armrests:

'...The best arm rests are padded for comfort and warmth.'

Ellis, M. & Munton, J. (no date of publication given) Are you sitting comfortably? leaflet Arthritis & Rheumatism Research Council, p7

[275] '6. Armrest Padding and covering.

a. On hard armrests, edges and corners with radii less that 3" (0.8cm) cannot be tolerated for long.

b. Armrests should be padded if the seat is to be used for periods of over one hour.

c. Padding need only be 0.5-0.8" (1.4-2cm) thick if its density is sufficient to prevent bottoming.

d. Armrest covering can be the same as the seat cushion, providing that the covering is smooth.' Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p21

[276] '...rheumatoid arthritis sufferers need a good layer of padding on the arms of chairs...' Wilson, D. (1982) In Practice, General Practice, Nov. 5, p22-44 (p43) (No. 10 in a series)

[277] 'The first point to look for is a good hand grip. You will find them easier to grip if they are made of wood and protrude a few inches. This will allow you to wrap you fingers around the end. Secondly, the best armrest are padded for comfort and warmth; the protruding wooden ends should not have sharp edges to hurt your hands.' p7

Ellis, M. & Munton, J. (no date of publication given) Are You Sitting Comfortably?, ARC, Chesterfield, Derbyshire

[278] '5. Armrest height.

a. The armrest height, which is measured form the compressed seat, is 7-10" (17.8-25.4cm) for most adults. An average value of 8.5" (21.6cm satisfied most people.

- the right length in relation to the seat (Ellis & Munton, no date given)[279] & (Dreyfuss, 1981)[280]
- the right width (Ibid.)[281]
- the right distance apart (Ibid.)[282]

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b. High armrests elevate or round the shoulders, causing stiffness or pain in should and neck muscles.

c. Low armrests are conducive to excessive body slump and leaning to one side.

d. Adjustability should be considered in designing for those who sit for long periods at critical work.

e. Armrests can be at the same level as tables and desks for playing card and writing.

f. Armrests can be parallel either to the seat surface or to the floor.

g. A finger clearance of 1.5" (3.8cm) is needed for armrest that pass under a table to prevent possible injury on pulling the chair into position.'

Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p21

[279] Armrests should be that correct height and length:

'It is important that the arm rests are at the right height... Ideally the front of the armrest should be 9 inches higher than the seat.'

'Avoid any chair with armrests which protrude well beyond the front legs. This type often tips up when you put your weight on it.'

Ellis, M. & Munton, J. (no date of publication given) Are you sitting comfortably? leaflet Arthritis & Rheumatism Research Council, p7

[280] 'Armrest length

a. The most comfortable armrest are long enough to support the full arm and the base of the hand. The minimum dimension for accomplishing this is 12" (30.5cm), measured from the backrest.'

b. On lounge chairs the armrest length can be the same as the seat length, or greater is the backrest reclines. Armrests must always support the elbows...'

Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p21

[281] '3. Arm rest width

a. Arm rest widths less than 2" (5.1cm) create insecurity and muscle tension.

b. Widths of 2.5-3.5" (6.4-8.9cm) are adequate.

c. Wider armrests are considered luxurious.'

Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p21

[282] '4. Arm rest spacing

The back, including shoulders and head, should be supported along its length (Ellis & Munton, no date given)[283] & (Dreyfuss, 1981)[284], with the spine resembling 'as near

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a. Arm rest spacing must be separated only enough to permit seat entry of the larger sitter. If they are too far apart, slender people have to either hang their elbows inside or to use only one armrest.
b. The minimum space between the insides of the armrests is 19" (48.3cm)
c. The maximum space is 22" (55.9cm), which accepts the large male wearing heavy winter clothing, but this is too wide for the comfort of most people.'
Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA,

[283] Support from the seat back and head rest
'...It is important that your back is fully supported.'

'The backrest should be high enough to support all of the back, shoulders and head.'
Ellis, M. & Munton, J. (no date of publication given) Are you sitting comfortably?
Arthritis & Rheumatism Research Council, p13

[284] '2.a. Thoracic Support
a. Relaxing chairs must support the thoracic region of the back as well as provide correct lumbar support.
b. Height of the full back support for relaxing is 21-28" (53.3-71.1cm) above the seat.
c. Backrests under 15" (38.1cm) high, measured from the top edge to the compressed seat, permit shoulder movement and can be used occasionally as armrests. The height is too short for relaxation comfort.
d. The back rest for relaxing chairs should be at least the same width as the seat, or wider to provide support for the upper arms and to allow the body to assume many postures.
e. The area of the thoracic region at shoulder blade level is nearly flat.
Backrests with a concavity having a radius less than 40" (101.6cm), measured horizontally should be avoided as they tend to round the shoulders and create muscular strain.
f. The back rest-to-seat angle should not create hip angles less than 90° since they cause flattening of the lumbar curve by tilting the pelvis, which may lead to abnormal muscular tension and cramping. Back rest-to-seat angles of 95-100° are good for most purposes; 95° angles should be used for dining chairs 95-97.5° angles are good for the alert posture while driving; lounge chairs should exceed 100°.'

'3a. Sacrum Support

as possible an 'S' shape'. (Rees, no date given)[285] That is, providing a lumbar support (author not noted, 1977)[286] & (Dreyfuss, 1981)[287] and a cervical support.

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a. The sacrum is an area about 3.5" (8.9cm) high beginning about 3" (7.6cm) above the compressed seat.
b. When added to lumbar and thoracic supports, sacrum supports increase comfort by stabilising the pelvis and by distributing back pressure over a greater area.'
Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p21

[285] Supporting the back
'Your spine should resemble as near as possible an 'S' shape and be firmly supported by the backrest.'
'Your bottom should reach the base of the back rest so that you are fully supported.'
'You should not slide forwards in the chair'.

'Chairs to avoid: *(in note form)*
Seat too long = pressure on back of knees, no support for spine. Difficult to get out of.

No support = Backrest straight = no support for lower spine. Inadequate support form upholstery = rounded back. Difficult to get out of.
Rees, M. (no date of publication given) Better Ways to Choose a Chair, leaflet, Ashley Healthcare Ltd

[286] 'Andersson and Ortengren (1974) studied the effect of a lumbar support on the disc pressure. When in increasing the lumbar support up to 5cm on the level between L3 and L4 they observed a considerable degree of the intra-discal pressure, and a reduction of the electrical activity.'
Grandjean, E. & Hünting, W. (1977) Applied Ergonomics, Ergonomics of Posture - Review of Various Problems of Standing and Sitting Posture, vol. 8.3, Sept. 1977, p138

[287] 'Backrest
1.a. Lumbar support
a. A backrest that does not maintain the natural curvature of the hollow in the back (the lumbar region) may induce backaches. Relatively vertical work chairs and secretarial chairs need full back support in the lumbar region. Chairs with full backrest should also include lumbar support.
b. The centre forward curvature of the lumbar region for adults is located about 9-10" (22.9-25.4cm) above the compressed seat cushion. It is better to have lumbar support a little high rather than too low in order to support back weight. The height of the centre of the lumbar curve change as a child grows.

Because everyone is a different size and shape, a single back rest profile is impractical. (Ward, Rogers et al., 1996)[288] & (Dreyfuss, 1981)[289] Despite Ellis & Munton's[290] advice against cushions, they allow adjustment of close support in the

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c. The depth of the support for the lumbar concavity in the sitting posture is 0.6-1" (1.5-2.5cm)

d. A padded lumbar support with a 10" (25.4 cm) radius in the vehicle plane accommodates most people.

e. Lumbar supports should measure 6-9" (15.2-22.9cm) from top to bottom. They are uncomfortable if they are too short.

f. They should be 13" (33cm) wide. However a lumbar support wider than this strikes the elbow and interferes with arm motions required in typing and other kinds of work.

g. A back rest curvature with a 12-18" (30.5-45.7cm) radius in the horizontal plan follows the roundness of the back and waistline.

h. Flexing backrest should be avoided because they create a feeling of insecurity.'

Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p20

[288]' ...Branton, (reference 44: Branton, P. (1984) Applied Ergonomics, Back Shapes of seated persons: how close can the interface be designed? issue 15, 105-7) in a study of back-seat interfaces for railway carriages, noted that the variations in detailed lumbar profile between members of the population are so great that any attempt to use shape data to design an accurately fitting seat would be unlikely to satisfy more than a small minority of the population. Secondly, a device constructed to accurately fit a body in one position may become inappropriate, uncomfortable or even dangerous when the shape of the body changes during normal use. Finally, a device that accurately follows a body's contours may produce undesirable pressures on soft tissues during use.'

Ward, J., Rogers, N. et al. (1996) Journal of Rehabilitation Sciences, Techniques for the measurement of the human body and its actions: applicable to design for physically disabled people, issue 9, no.2. p38

[289] 'Neck rest

1. Adjustable pillows should be used as neck supports for reclining seat, since it is impossible to find one location that satisfies the large range of occupants.
2. Pillows should be soft at the sides as cheek rests and resisting side tilting of the head.'

Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p21

[290] 'A properly designed chair should enable you to sit comfortably without having to resort to extra cushions.'

Ellis, M. & Munton, J. (no date of publication given) Are you sitting comfortably? Arthritis & Rheumatism Research Council, p14

lumbar area and as a head rest. (Dreyfuss, 1981)[291] Attention should be paid to supporting the neck. A neck/head rest is not always necessary, but it becomes useful if the seat-back reclines. (Dreyfuss, 1981)[292] The head rest should not push the head forward. (Dreyfuss, 1981)[293] & (Ellis & Munton, no date given)[294]

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[291] '2. Headrest size
a. minimum headrest height from top to bottom is 5-6" (12.7-15.2cm)
b. Height of the headrests should be adjustable.
c. Headrests can be included in the backrest, if so, they must be high enough to accommodate the large person.
d. Minimum headrest width is 10" (25.4cm)'
Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p22

[292] '8. Head angle.
b. The head angle, measured between the head rest and backrest reference planes, is 0-10° during relaxation.'

'3. Headrest position
a. Headrest angled 5-10° hold the head forward of the backrest plane, reducing strain of the neck muscles.'

'Headrest
a. If its backrest angle is more than 30° from the vertical, a seat needs a headrest; without one at greater angles the sitter slides forward to obtain support for the head on the backrest, which creates a poor, hammock-like posture. If the backrest is short, the sitter will eventually find himself sliding off the seat.'
Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p21

[293] '3. Headrest position...
b. The junction between the headrest and the back rest should be smooth to avoid an abrupt change in contour which interferes with the comfort of short people.'
Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p21

[294] 'A headrest is also to be recommended, but definitely not one that protrudes forwards; this will cause your neck to ache.'
Ellis, M. & Munton, J. (no date of publication given) Are you sitting comfortably?
Arthritis & Rheumatism Research Council, p13

The buttocks should be positioned at the base of the back rest and not slide forwards in the chair. (Dreyfuss, 1981)[295]

An arm chair seat tends to be slightly tilted backwards. (Dreyfuss, 1981)[296] & (Oborne, 1982)[297]

Research carried out in Japan, in the 1970's by Vamaguchi and Umezarva found that muscular tension measured between vertebrae reduced if the angle between the seat to back rest were increased. (author not noted, 1977)[298] Through similar studies, various

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[295] '4. Buttocks Zone

a. Back support below the sacral area, a distance of about 3" (7.6cm) to the seat, is not desirable because it presses against the buttocks, which expand during sitting.

b. Pressure on the buttocks is uncomfortable and tends to make the sitter more forward, thus losing the correct back support. If the backrest meets the seat cushion, the buttock zone must be very softly padded.'

Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p21

[296] 'Chair and Body Angles

1. Seat Angle

a. Seat angles are 0-25° above the horizontal at the seat reference point (SRP).

b. Small angles, 0-5° are used for dining chairs and work tables.

c. Large angles are used for seats with sloping backrests to prevent sliding...'

Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p22

[297] 'Seat angle: easy chair 19-20°; work chair less than 3°.'

Oborne, D.J. (1982) Ergonomics at Work, Wiley, p175

[298] 'Vamaguchi and Umezarva (1970) in Japan were the first to study systematically the effects of various seat inclinations on the spine. They recorded the tension between the apophyse of the vertebrae and examined which reaction of the seat angle and the backrest angle produced the lowest tension in the spine. The main results show that with a horizontal seat surface; a backrest angle of 125° is required to get a low tension in the spine. With increased seat angles, the backrest angle can be reduced without augmenting distortion of the spine.'

Grandjean, E. & Hünting, W. (1977) Applied Ergonomics, Ergonomics of Posture - Review of Various Problems of Standing and Sitting Posture, vol. 8.3, Sept. 1977, p138

ideal settings have been stated: 110-130° (author not noted, 1977)[299] 110-120° (Nachemson & Andersson, *in* author not noted, 1977)[300], 115° (Regan & Radke, 1964, *in* Oborne, 1982)[301] and 105-108° is the 'optimum relaxed angle'. (Grandjean & Burandt, 1973, *in* Ibid.)[302] 'The optimum back rest-to-seat range is 95-120° ...The most relaxing angle for a reclining chair is 130°, but it makes reading, conversation or watching television difficult.' (Dreyfuss, 1981)

For relaxing a seat-back is generally backward tilting, (Ibid.)[303] however for people with reduced mobility a more upright back is easier to rise from.

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[299] 'Figure 9. shows the recorded disc pressure and the electrical activity of some muscles of the back in relation to different back rest angles. The effects are clear: when the backrest angle is increased up to 110°, the disc pressure is gradually lowered, and in a similar way the electrical activity is decreased, i.e. with backrest angles between 110 and 130° we can expect a considerable relaxation of the back muscles, and a low intra-discal pressure.'
Grandjean, E. & Hünting, W. (1977) Applied Ergonomics, Ergonomics of Posture - Review of Various Problems of Standing and Sitting Posture, vol. 8.3, Sept. 1977, p138

[300] 'All the results of Nachemson and Andersson prove that low intra-discal pressure and low muscle activity are found in chairs with the following characteristics:
Backrest inclination (to the horizontal line) 110-120°
seats surface inclination 14°
lumbar support 5 cm.'
Grandjean, E. & Hünting, W. (1977) Applied Ergonomics, Ergonomics of Posture - Review of Various Problems of Standing and Sitting Posture, vol. 8.3, Sept. 1977, p138

[301] 'From an orthopaedic viewpoint, the appropriate angle would be about 115°. Regan and Radke (1964)... produced the nearest to a 'natural' lumbar shape. However, when sitting comfort responses have been cited from selected laboratory subjects, a less obtuse angle has consistently been found to be more comfortable.'
Oborne, D.J. (1982) Ergonomics at Work, Wiley, p179

[302] 'Grandjean (1973) discussed work which he carried out with Burandt to determine the optimum backrest angle for easy chairs when used for different reasons. Their data suggest that an angle of 101-104° is optimum when reading, whereas 105 to 108° is an optimum relaxed angle.' Oborne, D.J. (1982) Ergonomics at Work, Wiley, p179

[303] Angle of back rest and seat

10.2.3.2.1 Sitter is dynamic

Tilley (1993)[304] documents how postural slumping can alter measurements by up to 20mm. So it is essential that the sitter should be regarded as dynamic and anthropometric data a starting point for a design general purpose chair.

10.2.3.3 Different sizes & shapes of sitter

Shackel, Chidsey, et al. (1969)[305] sought to find a range of limits in which to design a comfortable chair. They found it was not possible to make universal definitions

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'2. Backrest-to-seat angle.

a. The backrest-to-seat angle must open the hip angle more than 90° to prevent jack-knifing, which allows the anterior hip muscle to shorten and cramp.

...d. When 180° is reached, the chair becomes a flat bed.'

'3. Backrest angle

a. Backrest angles are 10-45°, measured from the vertical....c. The larger the angle, the more relaxing the seat is, since some of the body weight is shifted from the seat to the backrest.'

Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p22

[304] Straight or slumped Posture

'Measurements can vary depending on posture. Height varies between a straight or rigid posture as much as 0.2 to 0.8" (5 to 20 mm). There is a loss in height due to relaxing into a slumped posture.

Table of possible slumps		
posture	**men**	**women**
sitting	1.2" (30mm)	1" (25mm)
standing	0.3-2.6" (7.6-66mm)	0.32 (7.6-51mm)

Tilley, A.R. (1993) Measure of Man & Woman, Henry Dreyfuss Associates, The Whitney Library of Design: New York, p28

[305] '...the ultimate desideratum is a range of three dimensional limit profiles (external and internal limits) between which a chair design will be optimal, and some indication of the percentage degradation in comfort in each main direction.' p302

because of 'personal comfort sensations ...dependent considerably on the individual's body size and shape'. However, a general-purpose chair could be designed to be 'moderately comfortable' in various tests.

In a recently developed contract seat - Aeron, designed by Strumpf and Chadwick, produced for Herman Miller, three sizes where manufactured: small, medium & large to fit different users. A previously used 'mythical' abstraction of fiftieth percentile male was found to 'exclude 35 per cent of all women.' (Sudjic, 1994)[306]

10.2.3.3.1 Sitter is three dimensional & dynamic

In reviewing anthropometric data it is possible to forget that the sitter will move at all! The sitter should be considered as dynamic and sitting a dynamic process.

'...based on personal comfort sensations: these must be dependent considerably on the individual's body size and shape, and it may be that expertise in ergonomics chair comfort research cannot compensate for the inherent subjective factors specific to such individual body differences' p293

'A second, tentative, conclusion is that, since at least one chair was considered acceptable and moderately comfortable in all three test situations for the majority of users, a general-purpose chair can be design. However, when we seek reasons for the final rank order and for the differences between some chairs in different situations, in the hope of deriving criteria for selection and guidance for future design, the results so far help little.' p283

Shackel, B., Chidsey, K.D. et al. (1969) Ergonomics, The Assessment of Chair Comfort, vol. 12, no.2, p302, p293 & p283

[306] 'Manufacturers used to cater for the mythical fiftieth percentile male. Yet according to Strumpf and Chadwick, such an entity is no more that a statistical abstraction. The more real people differ from abstraction, the less they are able to use furniture designed for it. The height standards of the fiftieth percentile male, for example, effectively exclude 35 per cent of all women. The Aeron, on the other hand, is based on being as inclusive as possible. Its three sizes are designed to cater for the physical characteristics of individuals at both ends of the scale, from the first to the ninety ninth percentile, as well as those in the middle. Furthermore, it is, as Eames said, a chair design according to the way people sit.' p35

Sudjic, D. (1994) Blueprint (Promotion), (Playfulness) Have these men designed the most comfortable chair in the world?, October, 29-36

10.2.3.4 Contributory factors in sitter's perception of comfort

The seat covering is the interface between the sitter and the furniture. It is the most visual element of comfort. Dreyfuss (1981)[307] recommends that it should not be course in texture, but soft and smooth, be porous to absorb perspiration, low in static electricity and easily cleaned. The next associated feature is the padding, often foam of some sort. This should be firm enough to maintain support without 'bottoming', where the sitter feels an initial softness, only to land onto the internal structure.

In order to maintain the furniture and its immediate environment it needs to be moved. Casters or glides can enable this. (Ellis & Munton, no date given)[308] & (Dreyfuss, 1981)[309]

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[307] '7. Seat covering

a. Seat coverings with course textures are uncomfortable for people wearing thin clothes...

e. Seat materials should be porous enough to breathe.

f. Since people perspire, moisture must be absorbed and evaporated.

g. Static electrical effects should be minimised.

h. It is desirable to have seats that can be cleaned easily.' p20

'4. Headrest padding and covering

a. Headrests should be softly padded.

b. They should be covered with soft, smooth material.' p21

'5. Backrest Padding & Covering

'...b. Padding of the thoracic support should be soft, with protection against bottoming. Padding of the lumbar support must be firm enough to maintain the normal lumbar curve.' p21

Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, 21

[308] '...it might be wise to choose a fairly lightweight chair or one with fitted castors.' Ellis, M. & Munton, J. (no date of publication given) Are you sitting comfortably? Arthritis & Rheumatism Research Council, p16

[309] '2. Glides

a. Use of nylon glides to assist chair movement across floor surfaces, especially when carpeted, should be considered.

The ambient temperature of the surroundings contributes to the sitter's notion of comfort. In a warm environment the sitter is more likely to be able to relax. Wilson, (1982)[310] found that an ambient temperature of 20°C suited people with arthritis. Thermal comfort (Bruel & Kjaer, 1996)[311] is an area of study in itself, and not covered in this thesis.

10.2.3.5 Task furniture

There is a difference between task seating and that designed for relaxation (Shackel, Chidsey, et al. 1969)[312] Depending on the task, there is often accessory furniture involved with seating, for instance a desk or table.

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b. Resilient glides help make chairs more stable on uneven masonry floors.'
Dreyfuss, H. (Assoc.) (1981) Human scale, MIT Press: USA, p23

[310] Wilson, D. (1982) In Practice, General Practice, Nov. 5, p22-44 (p43) (No. 10 in a series)

[311] Bruel & Kjaer (1996) Thermal Comfort, Innova Air Tech instruments, Denmark

[312] 'The chair design for optimum comfort may not be the same for different uses such as general or desk sitting, but it may be possible to achieve acceptable compromise designs for general purposes.'

Shackel, B., Chidsey, K.D. et al. (1969) Ergonomics, The Assessment of Chair Comfort, vol. 12, no.2, p286

10.2.4 Visual references

The following images were referred to during the design process. They have been grouped according to the particular interest.

Few comments have been made about the designs, because it is their visual form which was of importance, not their historical context or that of their makers.

As the images are references, within the structure of the thesis, they should be presented as footnotes. This is not practical so they remain as part of the main text.

N.B. Apologies to the owners of the copyright of the diagrams, sketches and photographs from who permission has not yet been sought. Permission will be sought to reproduce these images for a library copy, or they will be omitted.

10.2.4.1 A visual logic

10.2.4.1.1 Adjustability

The following designs have metaphorical forms, their appearance describes their function: The lamp can be pivoted higher or lower, looping the hook on a different setting; the candle can be raised or lowered by hanging it on one a of several pegs (which can accommodate many other objects); the chair can be raised or lowered by supporting screw thread; the stool rocks on its curved base.

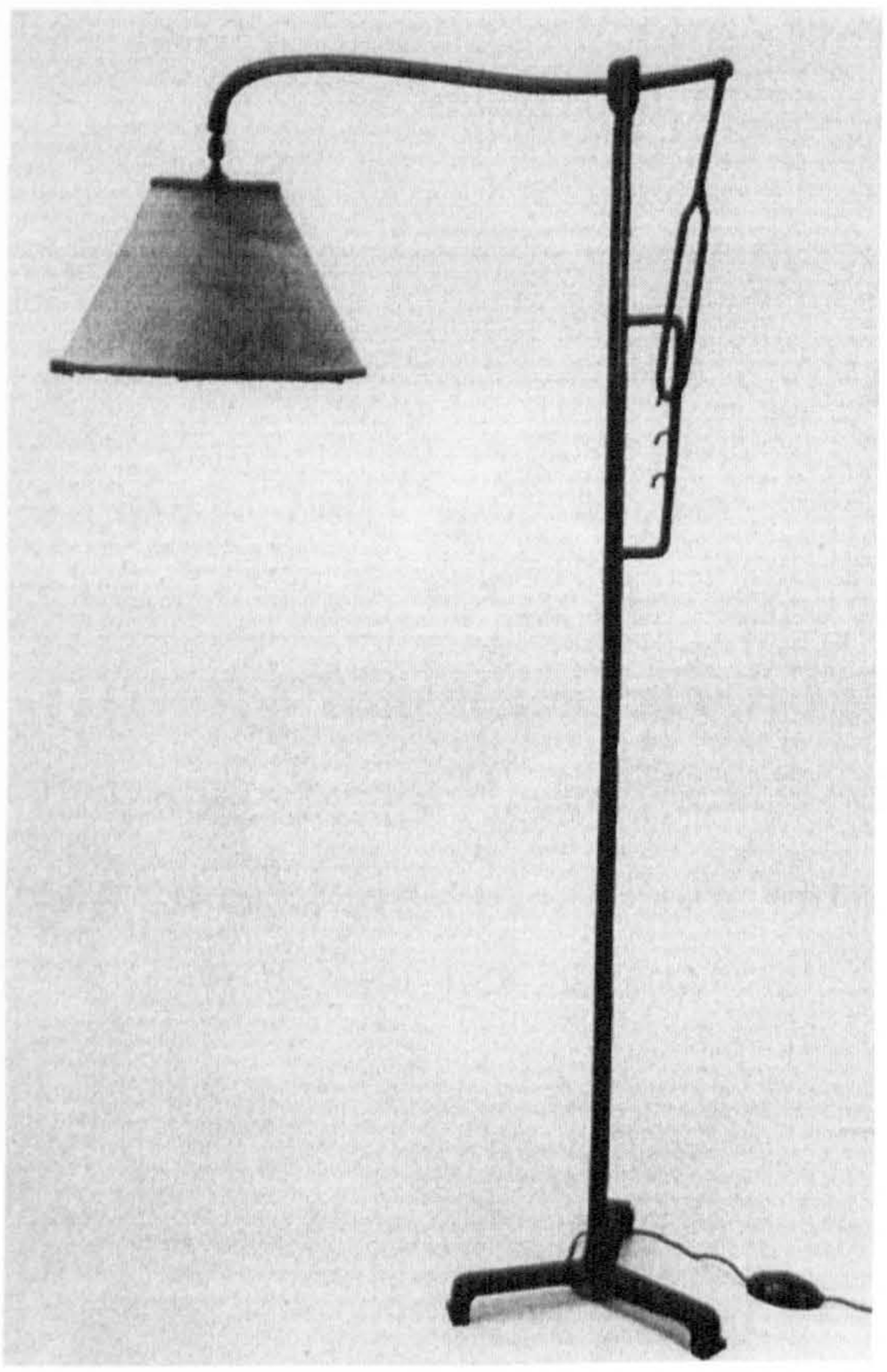

Figure 4. Hermes: Adjustable Standard lamp, 1930's *in* Sotherby's (1992), Applied Arts from 1880, Sotherby's Catalogue: London, Friday 15 May 1992, p302

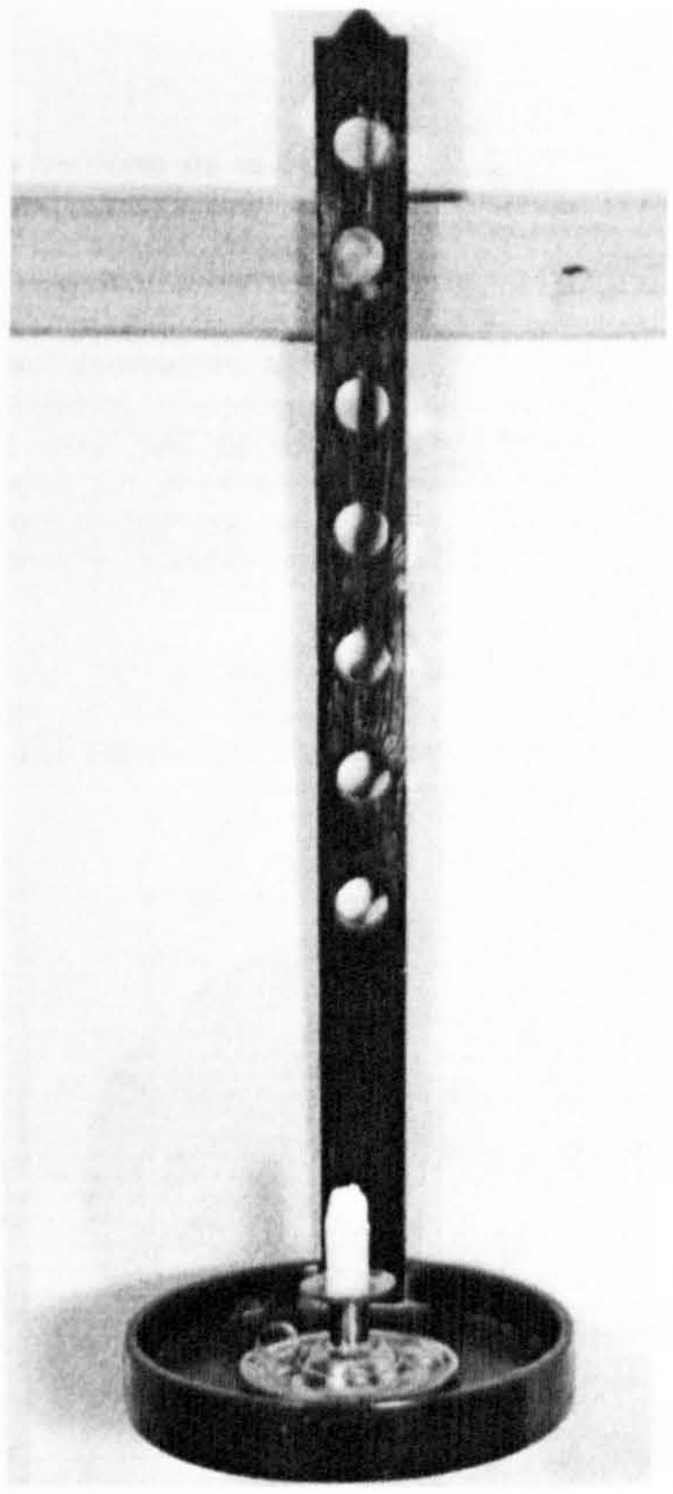

Figure 5. Tall Candle Sconce from Union Village (Warren County Museum, Lebanon, Ohio, N.Y.), photograph by Lees Studio, Chatham, N.Y. in Whitaker, T. (1968) A Benedictine-Shaker Link (unpublished) St Mark's Monastery, South Union Ky. *In* the Meader, R.F.W. (1972) Illustrated Guide to Shaker Furniture, p92, Dover Publications, New York

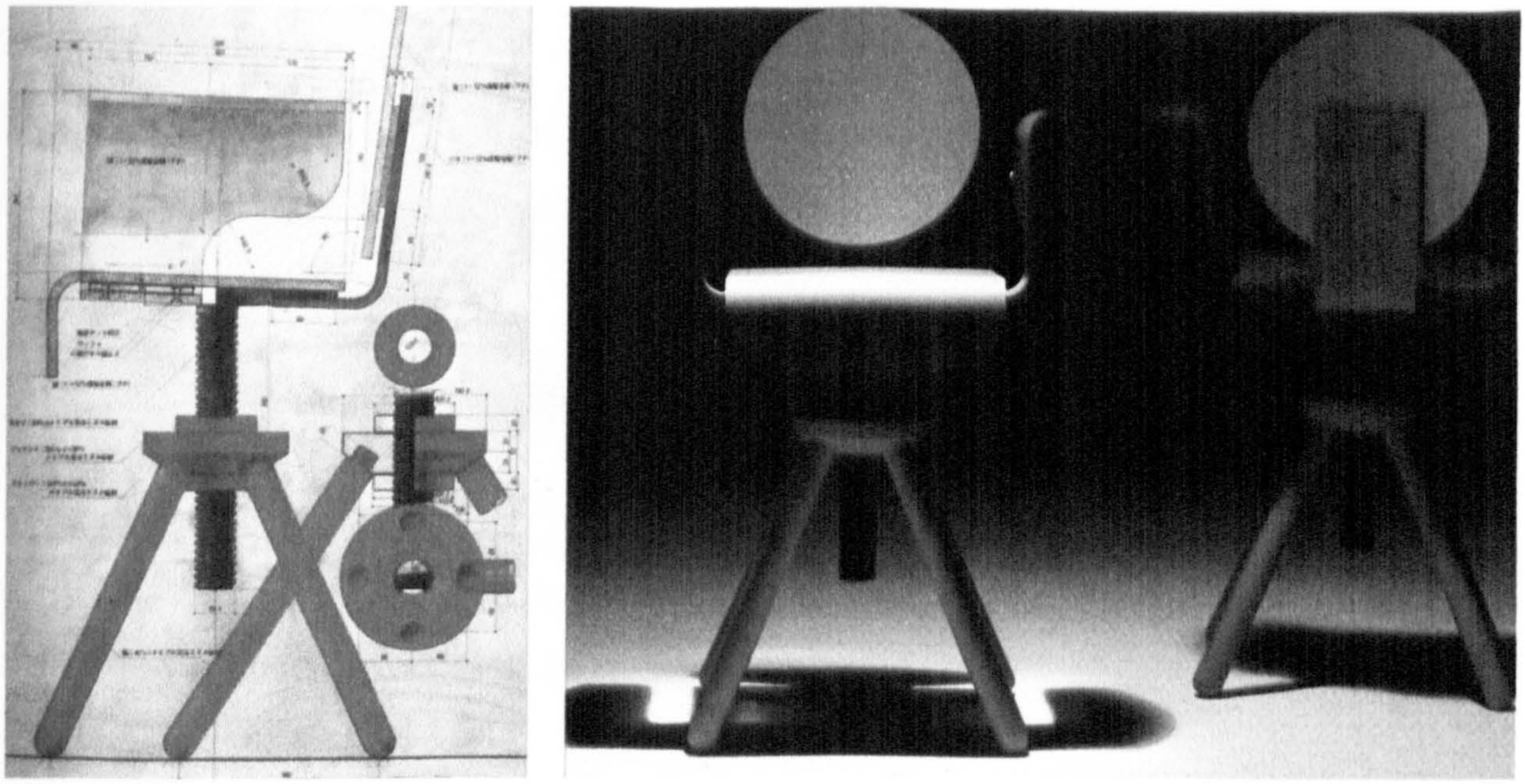

Figure 6. Shigeru Uchida: August Stool, photograph by Nacasa & Partners Inc.
***in* Evans, S. (1991) Contemporary Japanese Design, Collins & Brown: London,**
p75

Figure 7. Wolgang Laubersheimer: Hocker, 1992, for Stahlrohr, Multiplex.
photograph by Vernon Warren, Ffm

10.2.4.1.2 Panels

The panels allow for user choice as to where elements can be fixed, when they can be changed and what will be included in the arrangement.

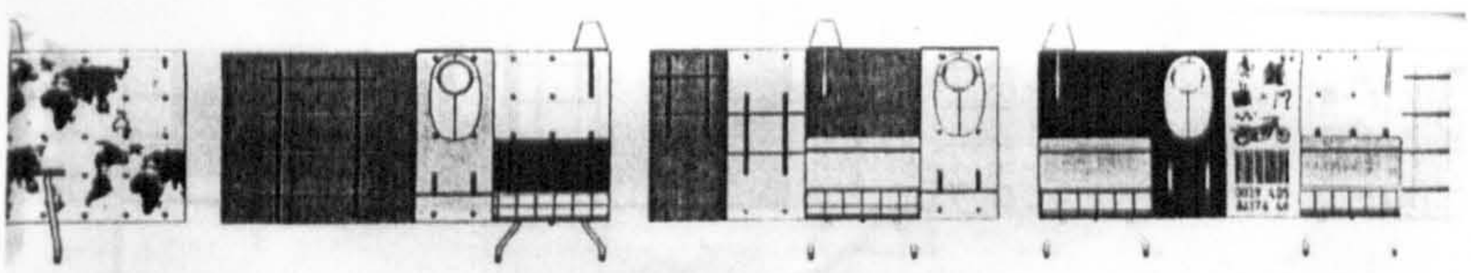

Figure 8. Donato Di Bello: Diagram of arrangements of Mixo System Interflex *in* (1994) Domus, no.764, Oct. 1994, p65-7

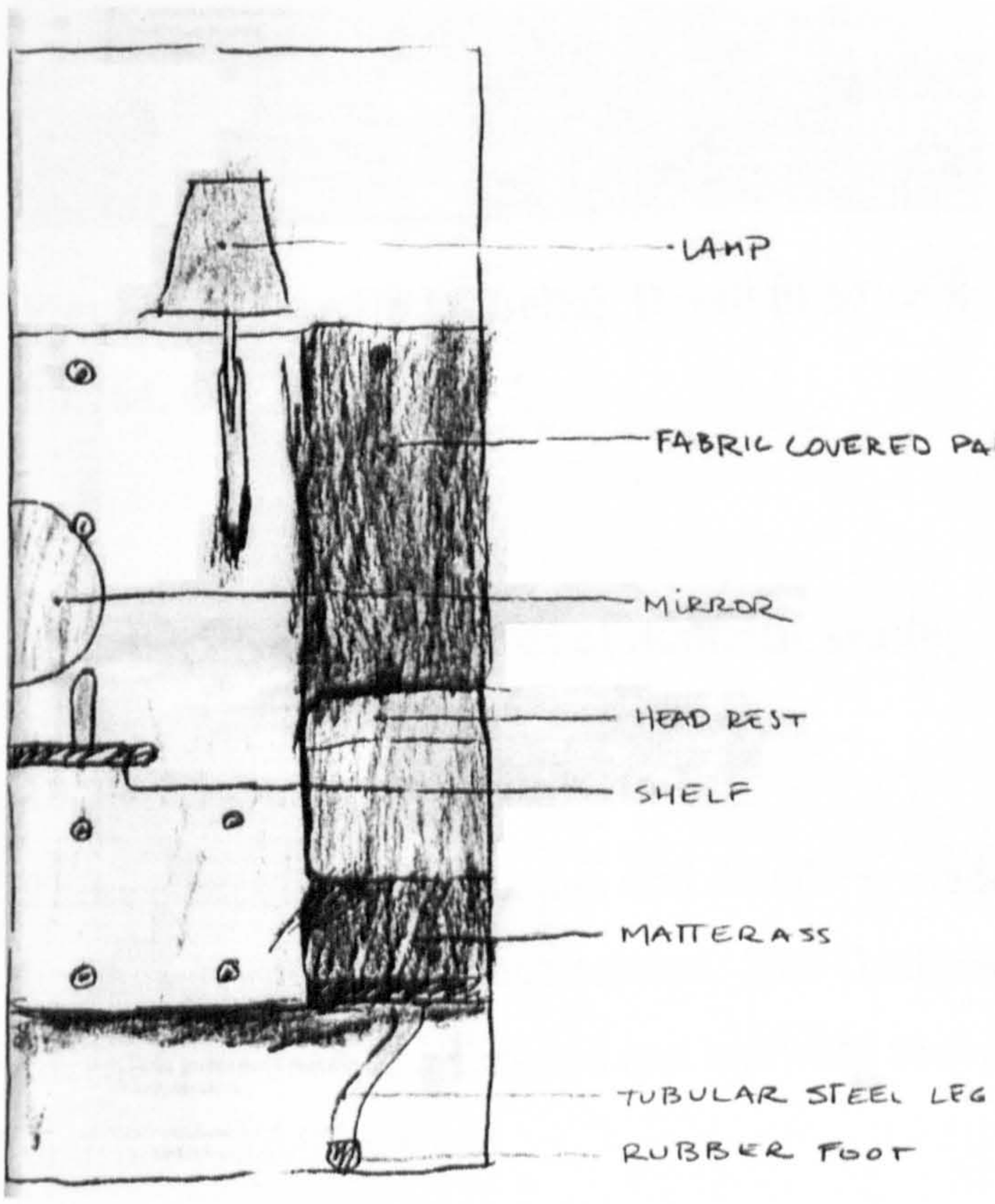

Figure 9. Donato Di Bello: Sketch of components for Mixo System Interflex *in* (1994) Domus, no.764, Oct. 1994, p65-7

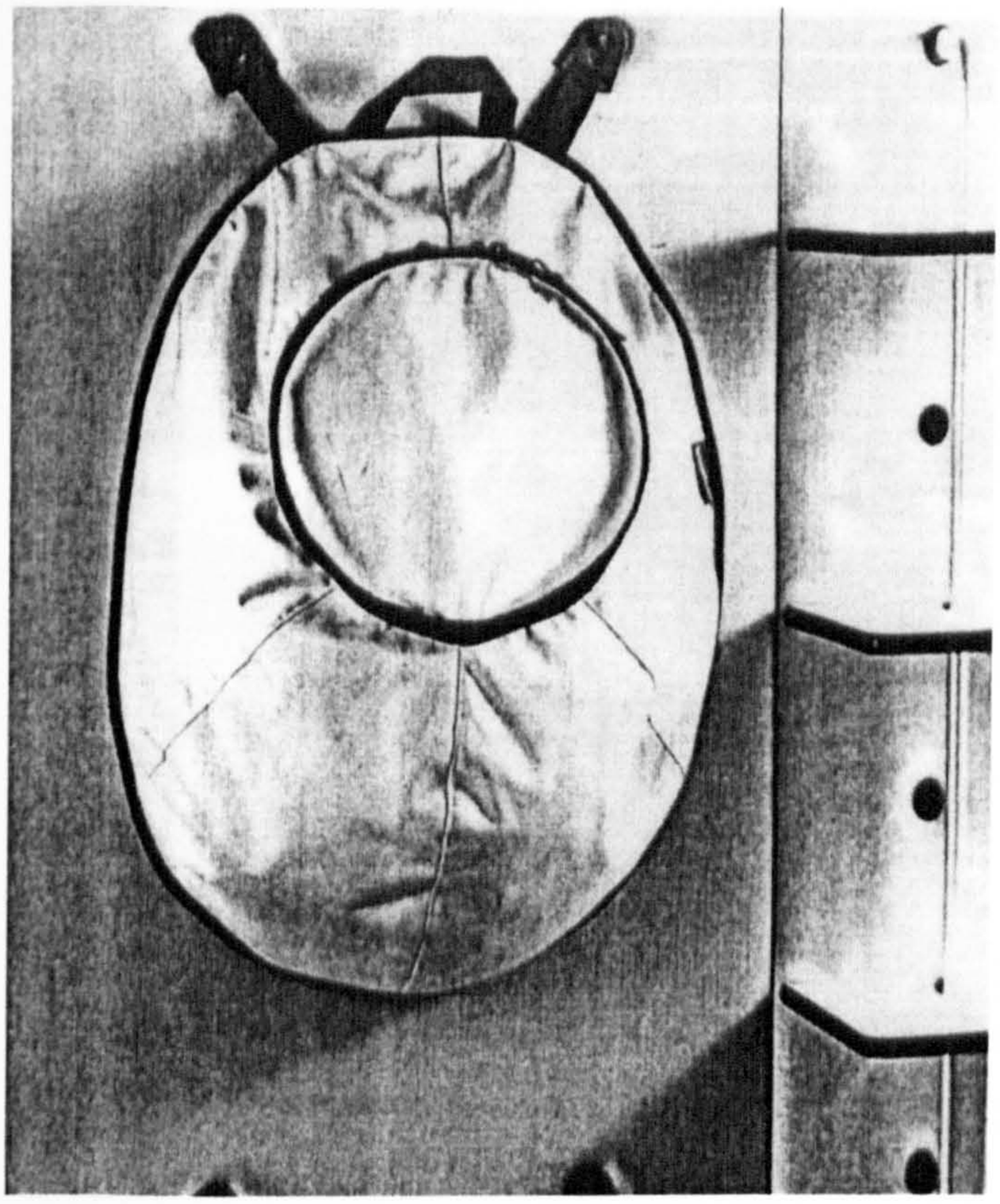

Figure 10. Donato Di Bello: Detail of Mixo System Interflex *in* (1994) Domus, no.764, Oct. 1994, p65-7

10.2.4.2 Visual references of domestic seating

10.2.4.2.1 Chair with arm details

These chairs have remarkable arm details, providing a surface, storage or a variable height support for various postures. The Gentleman's reading & writing chair is meant to be used in a forward and rearward seating position. All but one are, unusually, asymmetrical.

Figure 11. Tablet-arm chair from Watervliet circa 1825 (Shaker Museum, Old Chatham, N.Y.), photograph by Robert F.W. Meader, in Whitaker, T. (1968) A Benedictine-Shaker Link (unpublished) St Mark's Monastery, South Union Ky. *In* the Meader, R.F.W. (1972) Illustrated Guide to Shaker Furniture, p17, Dover Publications, New York

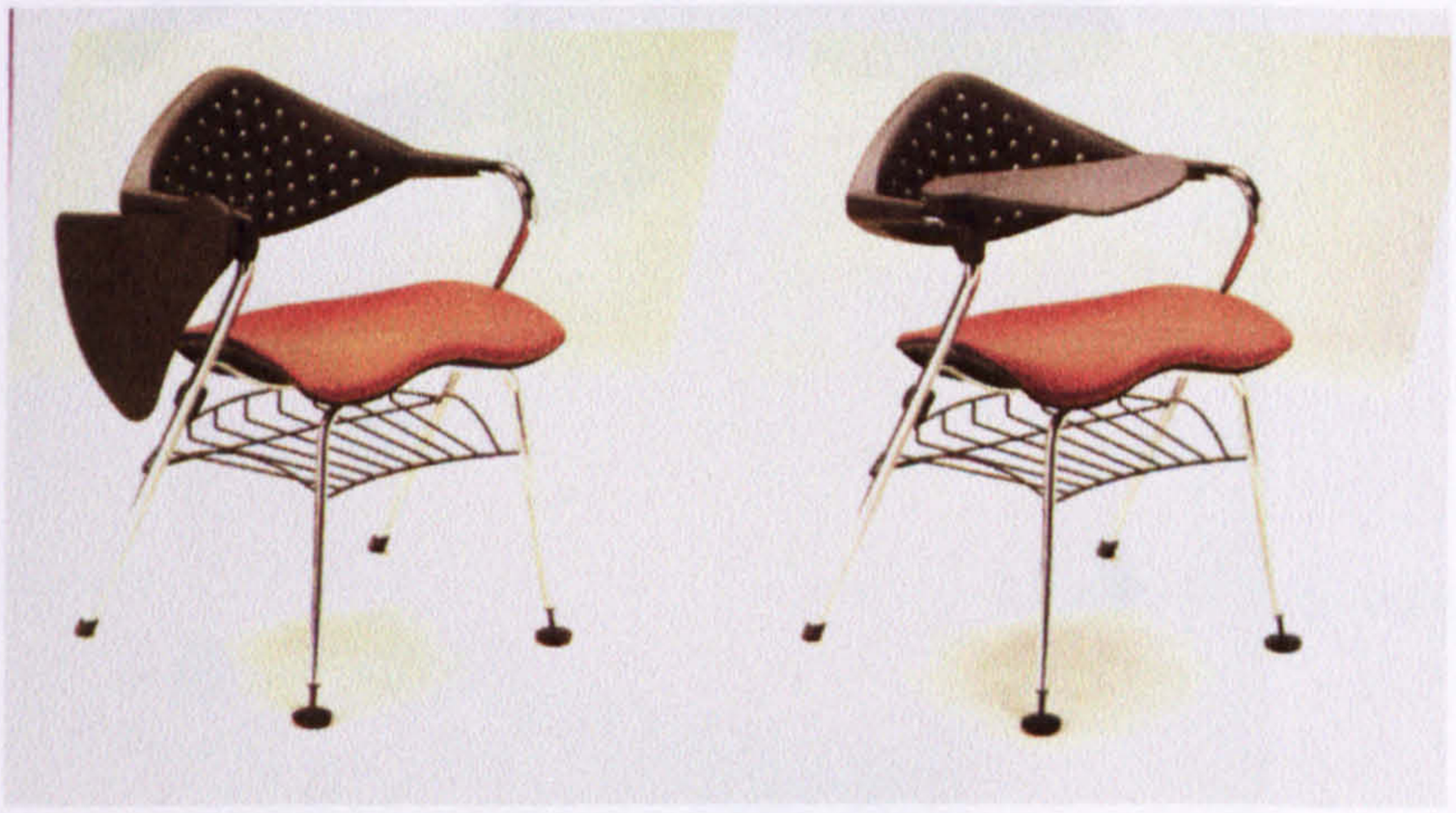

Figure 12. Uli Witzig with Henner Jahns: Vito for Sitag International *in* Sitag Office Views, p7

Figure 13. Gentleman's Reading & Writing Chair, photograph by Lucy Poole at Keddleston Hall, Derbyshire

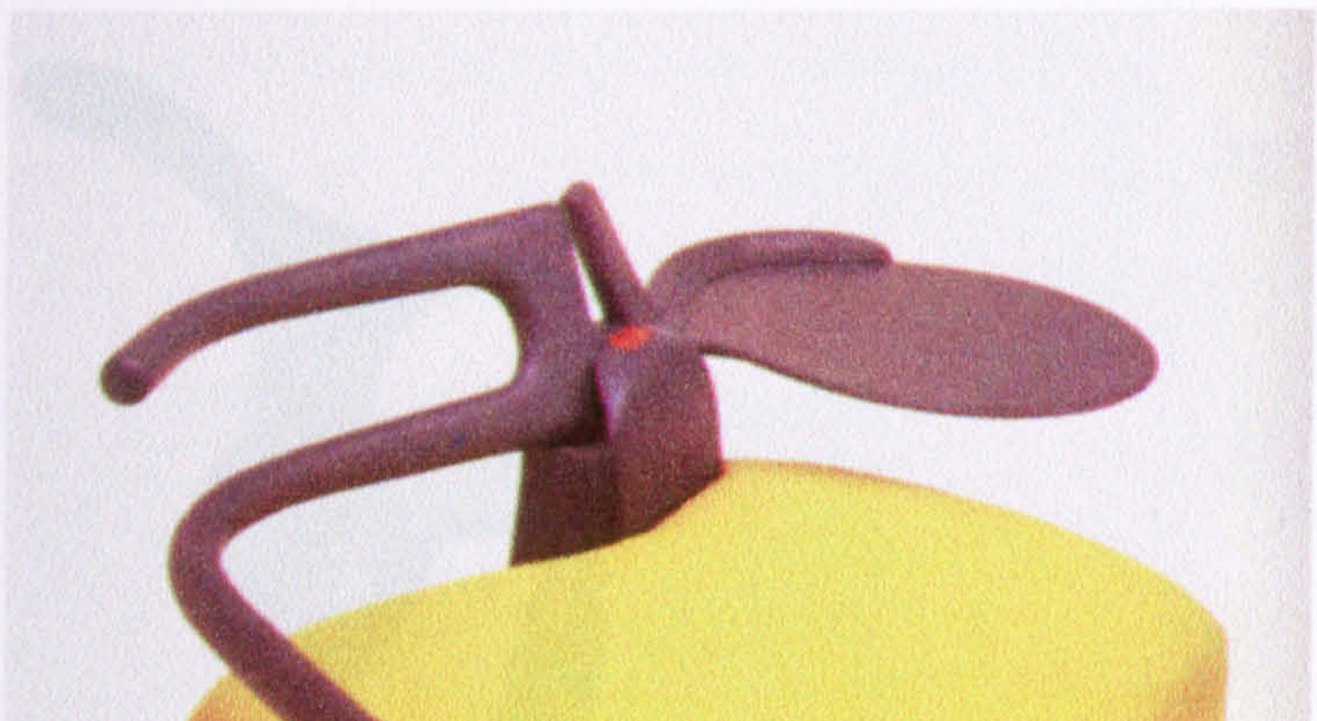

Figure 14. Fausto Boscariol: Mago for Seven Salotti, Viale Monza 17, 22034 Giussano Milano *in* (1990) Domus Jan. 1990, no.712

Figure 15. Mary Little: Armchair, 1985 *in* Sudjic, D. & Partington, A. (1988) <u>The Modern Chair: 20th Century British Chair Design</u>, ICA, 4.8.88-2.10.88, p37

Figure 16. Mary Little: Rudolf, *in* Women in Marketing and Design at Sit '95

10.2.4.2.2 Tall back chair

Despite recommendations that a sitter benefits from a full length back few chairs have a tall back.

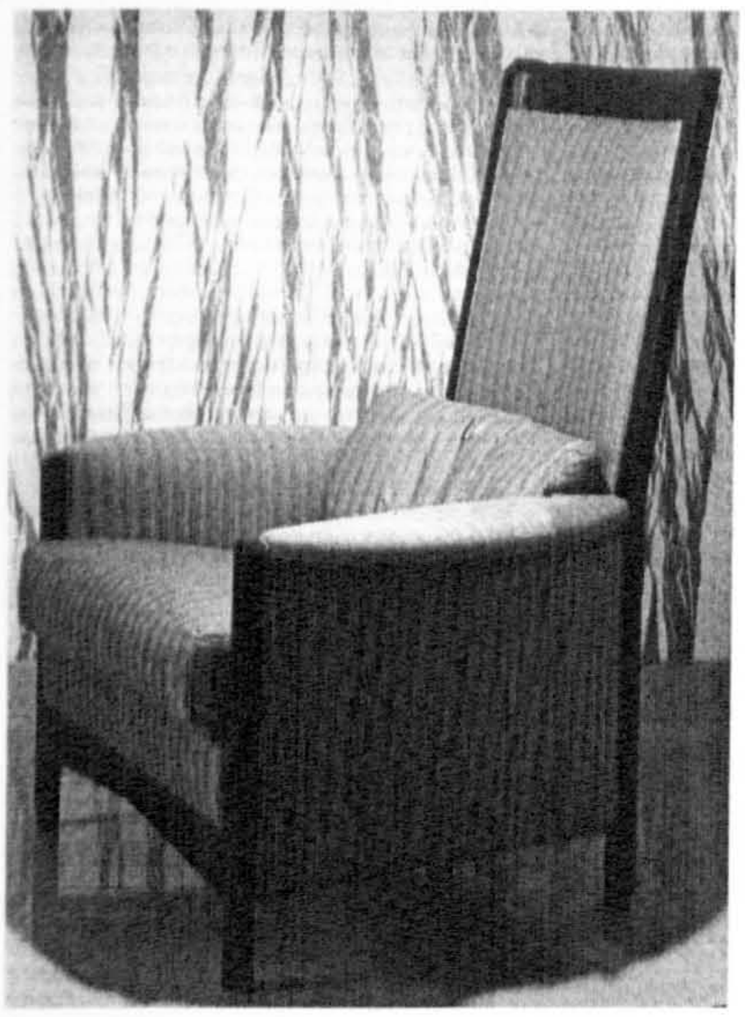

Figure 17. Tall back chair for Enzo Bertazzo fabric show room 20131 Milano -v. le Abruzzi, 70. (Journal unrecorded)

10.2.4.2.3 Two cushions

The Koga range included two cushions into the seat design, for the lumbar and cervical region. HAG have successfully proportioned the range of contract seats with a full back with adjustable cushions to fit the individual's back.

Figure 18. Peter Maly, Hamburg: Koga for Roset Mobel, Gundelfingen GmbH, Photograph by Zwietasch, Murr *in* (1991) MD Moebel Interior design, 6.91, p76

Figure 19. HAG: Signet, trade literature

10.2.4.2.4 Fabric covers

The fabric exterior of a chair is the main point of physical contact the sitter has with the product, but also the aesthetics of the seat is essential. The following images depict different type of upholstered cover. Mary Little used a dress making technique to construct her pieces, Vico Magistretti has tailored the 'horse blanket's in such a way as to make it imperceptible. Sue Pitman has classically styled the loose cover. These designs were considered in designing an easily removable, washable chair cover.

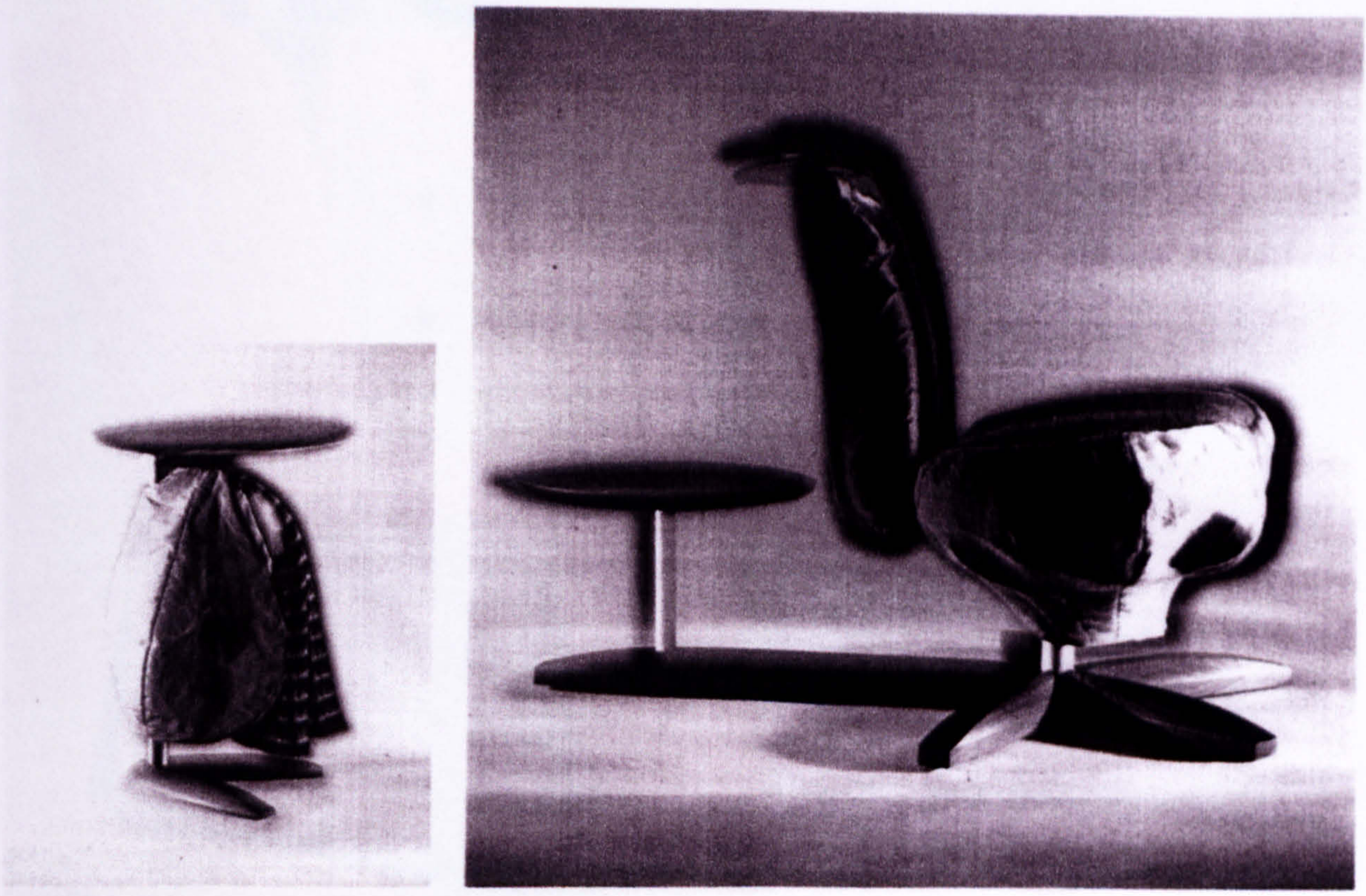

Figure 20. Mary Little: 'Annelies, in Silk Scarf and silk/linen seat & Anna, in silk body and Neisha trunk, 1996', photographs by Steve Speller *in* (1996) Blueprint, October, p14

Figure 21. Vico Magistretti: Horse Blanket Chairs, 1981

Figure 22. Styling by Sue Pitman: Loose cover, Photograph by Steve Dalton, p112, (Journal unrecorded)

10.2.4.3 Visual references with leg rests

Different options for supporting the legs were observed and grouped. These include some design 'classics' from Northern Europe, Australia and North America.

Configurations of full lengths chaise longues with and without cushions, dynamic and static usually adorn spacious interiors. Separate footrests allow for a more flexible use of space and most economic of all is a chair with a pull out footrest.

10.2.4.3.1 Static chaise

Figure 23. Alvar Alto: Chaise Lounge. 'Armchair 39', 1936-37 *in* Sotherby's (1992), Applied Arts from 1880, Sotherby's Catalogue: London Friday 15 May 1992, p302

10.2.4.3.2 Dynamic chaise

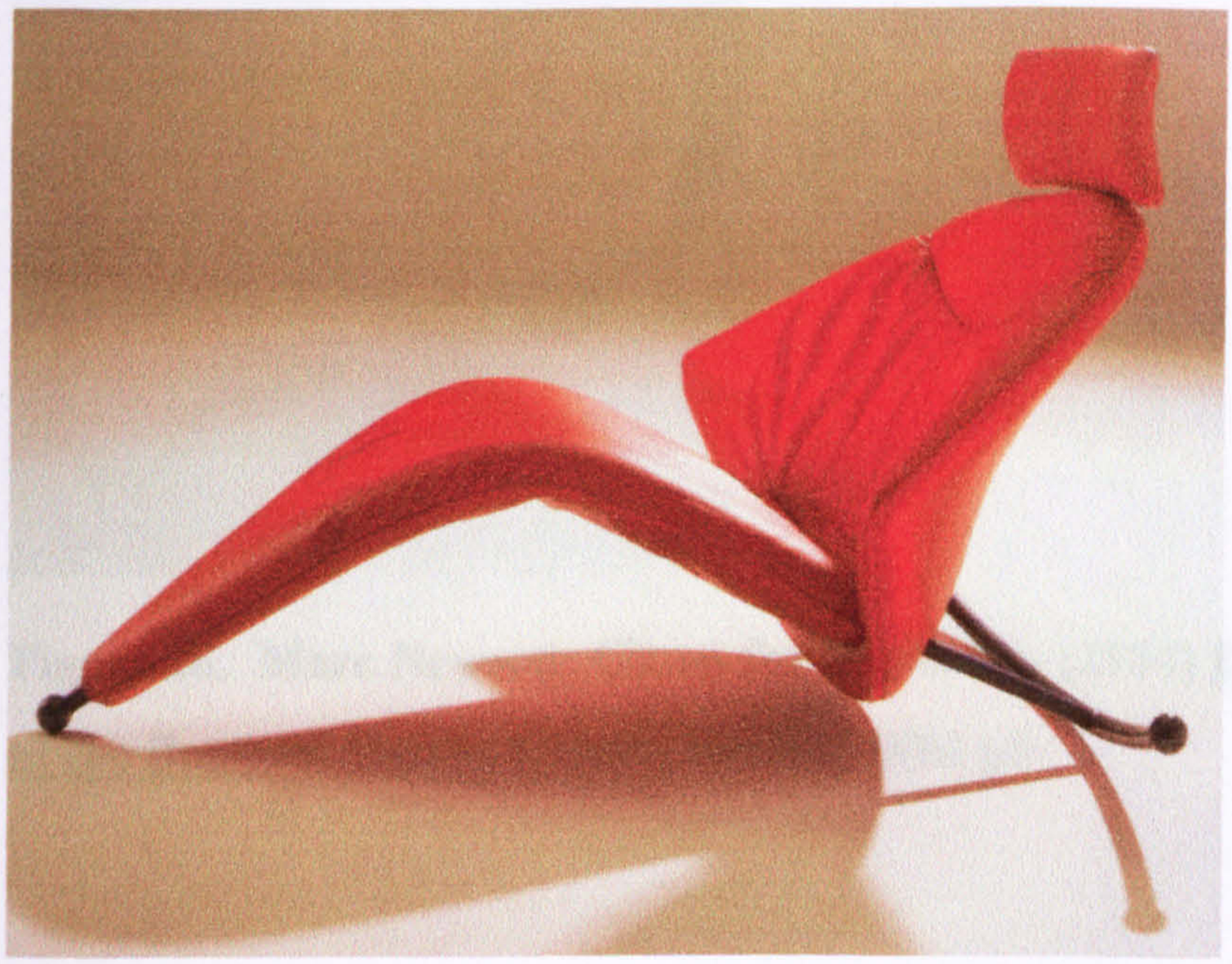

Figure 24. Prof. Stefan Heiliger: Culla for Strassle Collection CH-9533 Kirchberg SG

Figure 25. Peter Opsvik: Gravity for Stokke N-6260 Skodje, Norway

10.2.4.3.3 Chair with separate leg rest

Figure 26. Marc Newson: Gluon for Moroso *in* (1994) Design Business: Journal of the Business Design Centre, Spring, 1994 p5

Figure 27. Charles Eames: '670' Chair & '671' Ottoman, designed in 1956 *in* Sotherby's (1992), Applied Arts from 1880, Sotherby's Catalogue Friday 15 May 1992, p302

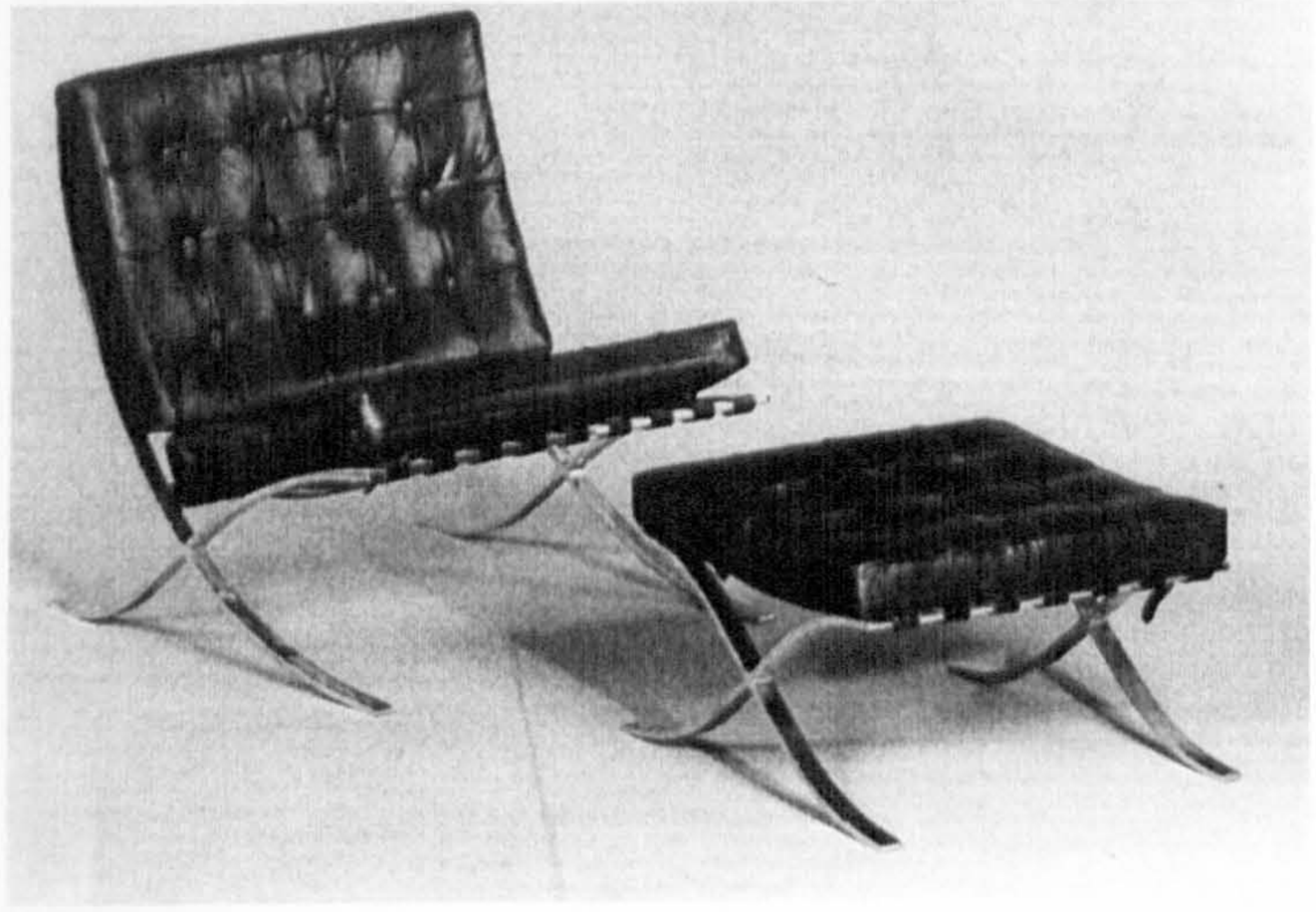

Figure 28. Ludwig Mies van der Rohe: Barcelona Chair (model no. MR 90) & Barcelona Stool, designed 1929 *in* Sotherby's (1993), Applied Arts from 1880, Sotherby's Catalogue: London, Friday 4 June 1993, p91

10.2.4.3.4 Chair with pull out leg rest

Figure 29. R. Colvil: William IV Mahogany Reclining Open Armchair *in* Christie's (1991) Fine English Furniture, Christie's Catalogue: London, Thurs, 11 July 1991 at 10.30am, p21

Figure 30. M. Marin & A. Chiaramonte: Sottosopra for Estasis Loc. Pratillo, 67100 L'Aquila, Marchio distruitio do Tixia, Via Cialdini 205, 20036 Meda, Milano, Italy *in* (1990) Domus Jan. 1990, no.712

Figure 31. Vico Magistretti: 123 Veranda for Cassina, PO Box 102, 20036 Meda, Milano, Italia

Figure 32. Toshiyuki Kita: Wink, photograph by Mark Slattery *in* Evans, S. (1991) Contemporary Japanese Design, Collins & Brown: London, p145

Figure 33. Tarcisio Colzani: Zabetta for Porada, via. P. Buozzi 2, 22060 Cabiate (Como) *in* (1995) Domus or Abitare (Journal unrecorded)

10.2.4.3.5 Chair with additional leg rest

Figure 34. Everstyl: Trocadero recliner, photographs by Carole Brandon & Studio Cadre Noir

10.2.4.3.6 Footrest

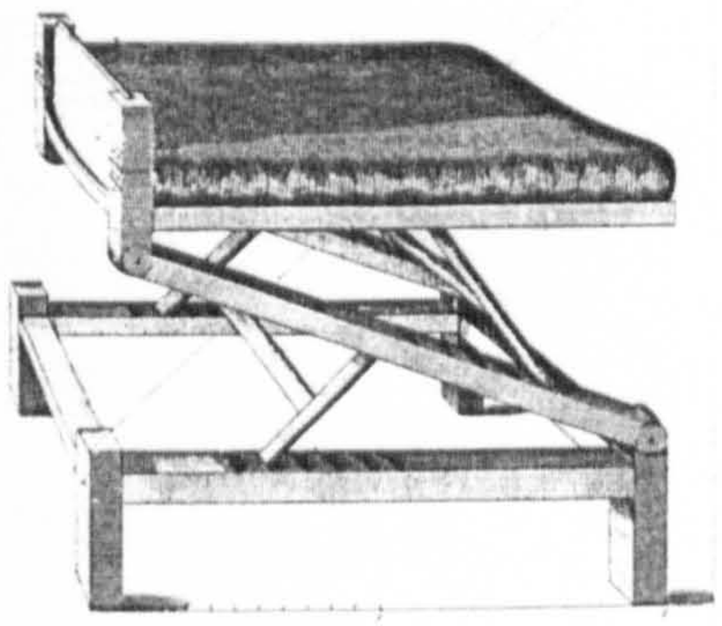

Figure 35. T. Sheraton: Gouty Stool *in* Sheraton, T. (1793) <u>The Cabinet Maker & Upholsterers Drawing Book</u>, Dover Publishers: N.Y., Pl. 30

10.2.4.4 Visual references of contract seating

Contract seating are usually sold in batches, see below - Pearl Dot's Spine line, or en masse. The Rovo chair is interesting, using some standard fittings and a bespoke frame to which the seat and back are attached and considerable height adjustments can be made, making it appropriate to a growing child or a range of statures. The Eames aluminium collection can be found in several configurations, with a tall back, upholstered in leather, with a footrest, with a four or five star base and on casters. A model similar to that pictured was used as a base for full sized mock-up work.

Figure 36. Pearl Dot Ltd.: Spineline, from the <u>Sit '91 Catalogue</u>

Figure 37. Rovo Chair: Buggy 3907 for Rovo Chair Int. (UK) Ltd., from the Sit '91 Catalogue

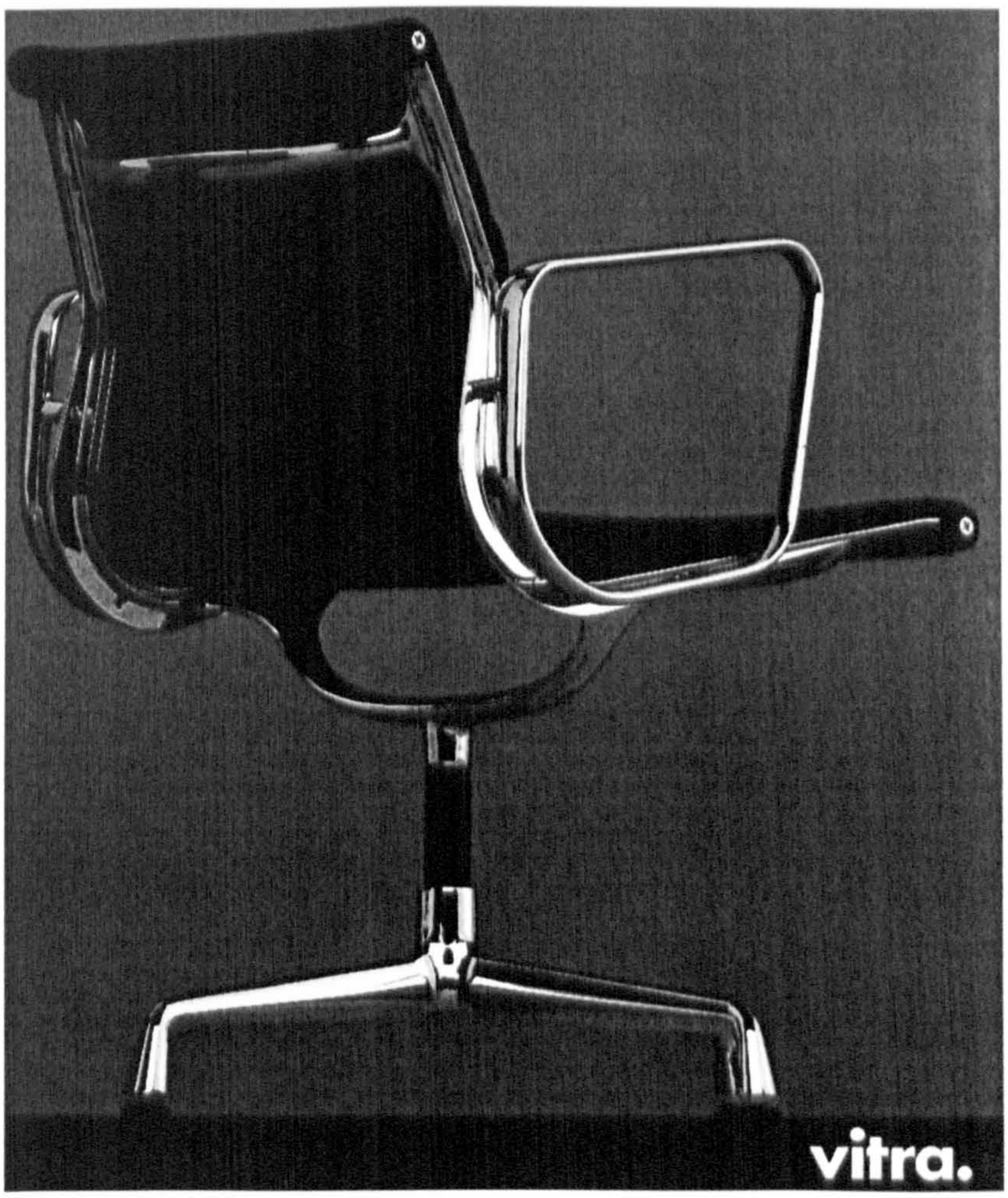

Figure 38. Charles and Rae Eames: Aluminium Collection, 1958, for Vitra Ltd., 13 Grosvenor St, London WV1 9FB

Figure 39. HAG: Signet collection, trade literature

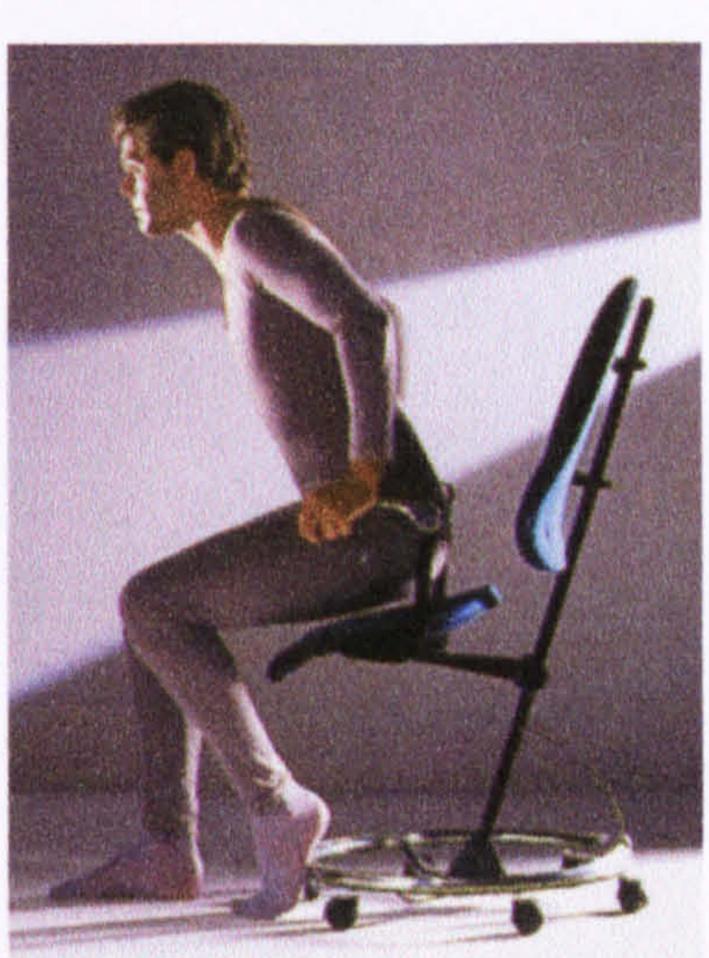

Figure 40. Michael Dye: Meridio for Hille Executive Furniture & Seating Ltd., trade literature, 1991

Figure 41. Bill Stumpf & Don Chadwick: Aeron for Herman Miller, photographs by James Wojcik *in* I.D. Sept/Oct. 1994, p60

10.2.4.5 Visual references for material qualities

The material of a product, can compliment its form or it can be instrumental in achieving a form. The leather used on the armrests of Italo Lupi's chair will be warm to touch and is figured by stitching. Depending on the finish of the armrests, the leather could absorb the oils from the hands of the sitter and develop a rich shinny patina. The seat of the Jamaica stool is carved in blocked timber. Magistretti uses the form of a saddle for the Incisa chair, this is also figured with stitching and produced in leather. The seat of the community chair is shaped, either when the timber is 'green' and pliable, steam bent or laminated, which ever technique is used the result is an invitingly curvaceous seat.

Figure 42. Italo Lupi: Morozzi for Giorgetti Matrix, 20036 Meda (Mi) via Manzoni 20, photograph by Rudolfo Facchini *in* (1990) Domus Jan. 1990, no.712

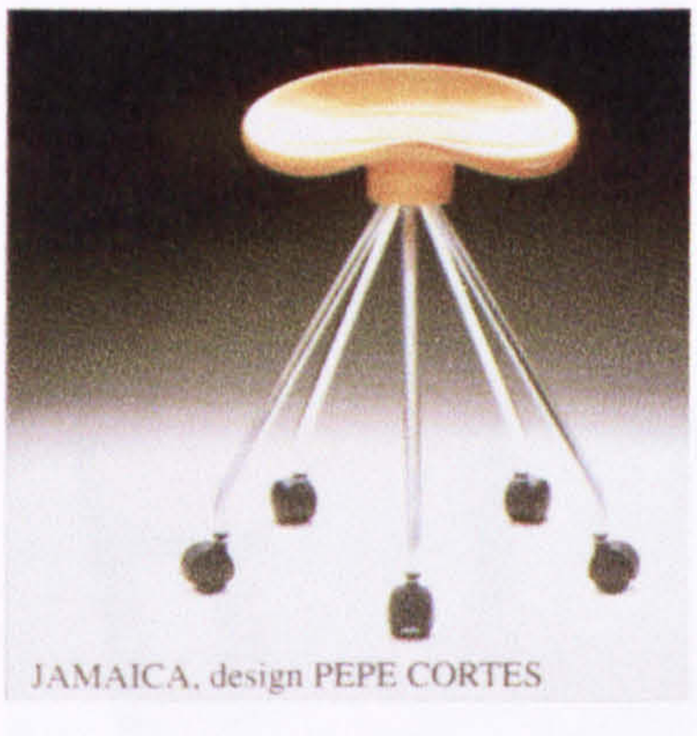

Figure 43. Pepe Cortes: Jamaica Stool for Amat Muebles, Para Colectivades, S.A., Cami Can Bros, 08760 Martorell, Barcelona, Spain

Figure 44. Vico Magistretti: Incisa, photograph by Gionata Xerra in (1995) Domus, no. 767, Jan. 1995, p53

10-177175

Figure 45. Community Playthings: Hardwood Chair with shaped slats (1994) *in* <u>Community Playthings Catalogue</u>, p44

10.2.4.6 Visual references for storage & surfaces

10.2.4.6.1 Chair with storage

The following seats have integral storage. Kuramata's and Hoffmann's chairs appear to be for general domestic use while the two shaker chairs are workers chairs. Storage can be easily be accessed from a seated position on the Shaker chairs. The sewing chair has been adapted for long periods of sedentary work, by applying rocking sleds and by freeing the arms of the sitter by omitting armrests.

Figure 46. Shiro Kuramata: Chair with Drawers, photograph by Mark Slattery *in* Evans, S. (1991) Contemporary Japanese Design, Collins & Brown: London, p144

Figure 47. Josef Hoffmann (Circle of): Cabinet, circa 1905-10 *in* Sotherby's (1993), Vienna 1900, Sotherby's catalogue Thurs 23 Sept. 1993, p39

Figure 48 Sewing Chair (Shaker Museum, Old Chatham, N.Y.), photograph by Lees Studio, Chatham, N.Y. in Whitaker, T. (1968) A Benedictine-Shaker Link (unpublished) St Mark's Monastery, South Union Ky. *In* the Meader, R.F.W.

(1972) Illustrated Guide to Shaker Furniture, p15, Dover Publications, New York

Figure 49. Shoe-maker's bench (1841) (Shaker Museum, Old Chatham, N.Y.), photographs by Lees Studio, Chatham, N.Y. in Whitaker, T. (1968) A Benedictine-Shaker Link (unpublished) St Mark's Monastery, South Union Ky. *In* the Meader, R.F.W. (1972) Illustrated Guide to Shaker Furniture, p90, Dover Publications, New York

10.2.4.6.2 Graduated tables

These graduated surfaces are such a simple concept. They have uncomplicated forms are balances as a group and in relation to the bed.

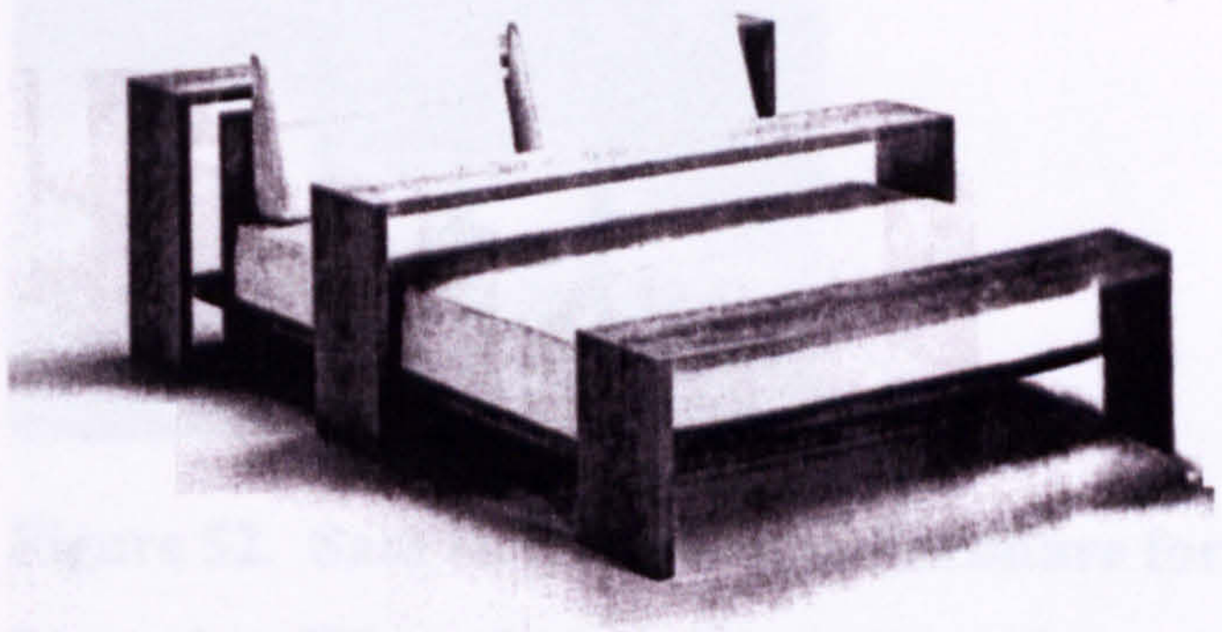

Figure 50. Produzione Industria Siciliana de Legno, photograph by Fotografi Associati Palmero *in* (1994) Domus, no. 766?, December, p58-9

10.2.4.6.3 Cabinets

The following cabinets are all wheeled. In their function they would be suitable in an office or domestic environment. They are undecorated and rely on their material and method of construction for their aesthetic character.

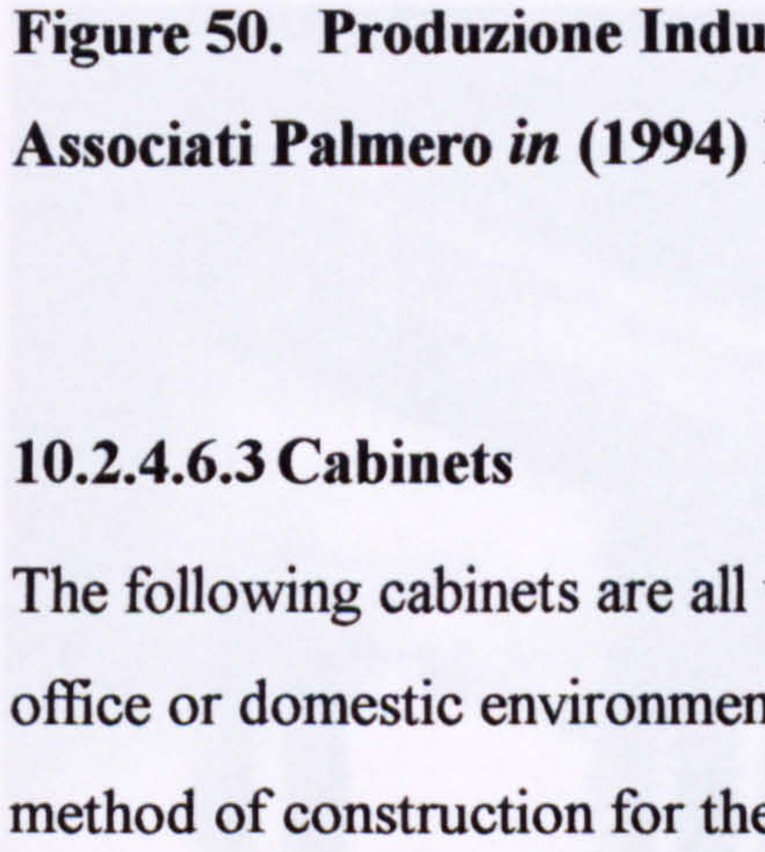

Figure 51. Jasper Morrison: 'Universal System' for Cappellini, Via Marconi 35, 22060 Arisio, Italy. *In* Kime, G. (1991) World of Interiors, Milan, Sept. 1991, p21

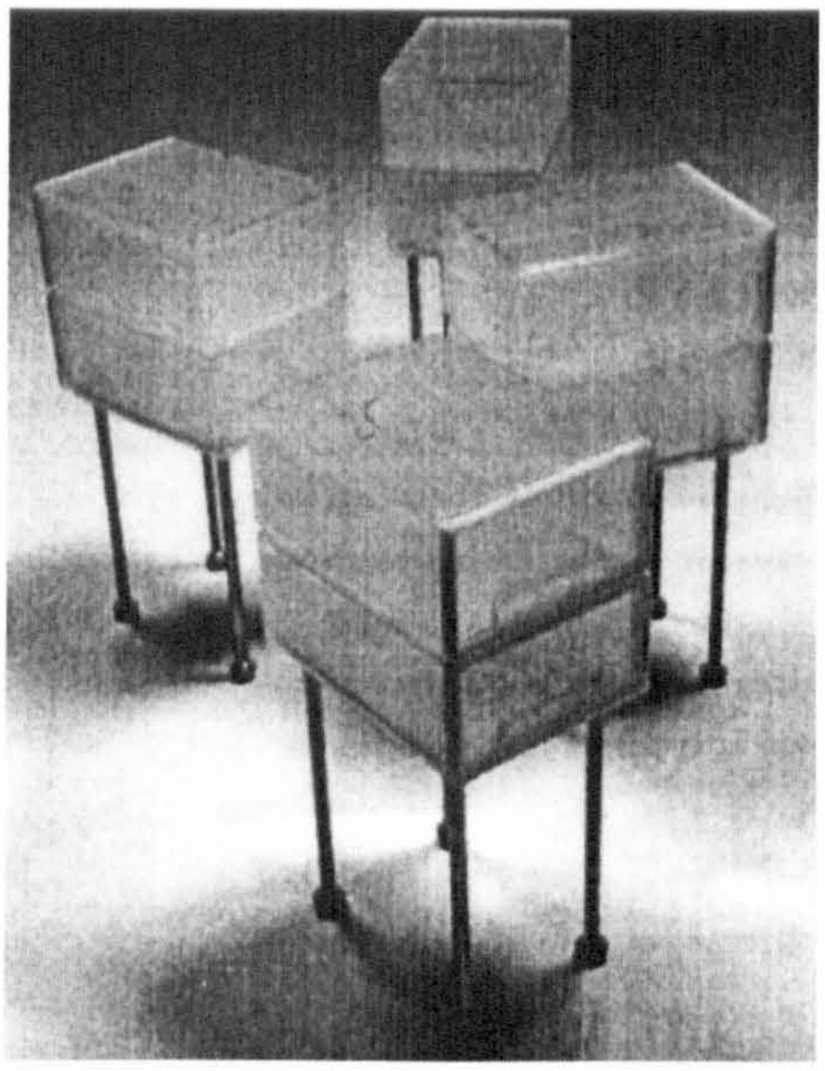

Figure 52. Sam Hecht: Mobile Furniture for IDEO's Tokyo Office *in* (1996) Blueprint, Where Life & Work Blur, Oct., p43

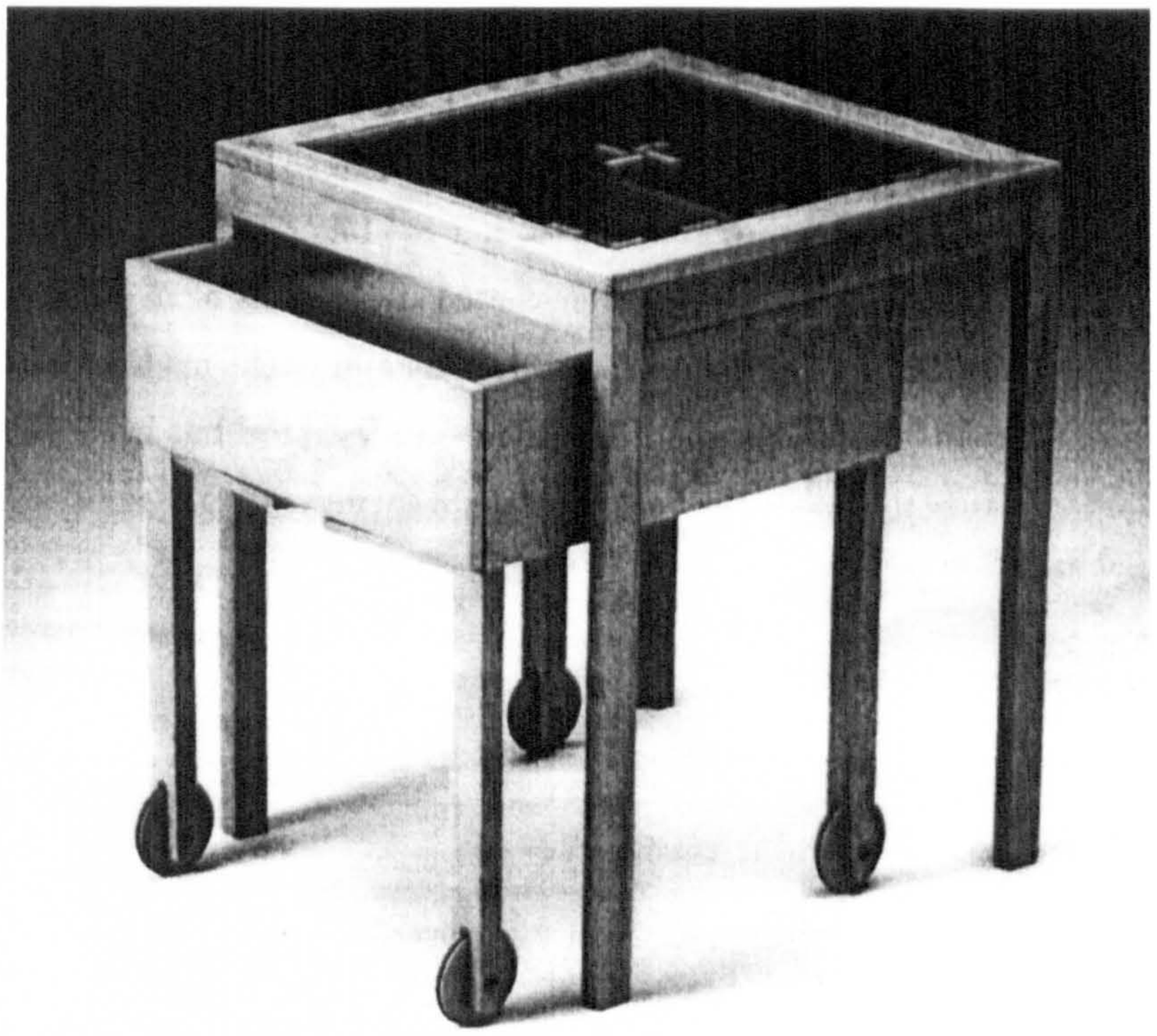

Figure 53. Ferran Granana: Nexus Desk *in* (1996) Blueprint, News: Plain in Spain, Nov. p16

10.2.4.7 Visual references of specialist seats

The first two specialist seats are examples of the more contemporary aesthetic available for the UK market. The majority of the rest of the market is reproductions of historic styles, e.g. Queen Anne. Flemming Hvidt's Young Chair is almost the same as the Multi-chair in form, but it is upholstered in bold, unpatterned fabrics. Apparently, the UK upholstery market prefers more subdued, floral designs.

Figure 54. Shackletons: Conniston Suite, Trade Literature

Figure 55. Flemming Hvidt, Denmark: Multi-Chair, Multi-care seating system, for A. J. Way & Co. Ltd., Unit 2, Sunters End, Hillbottom Rd, Sands, High Wycombe, Bucks

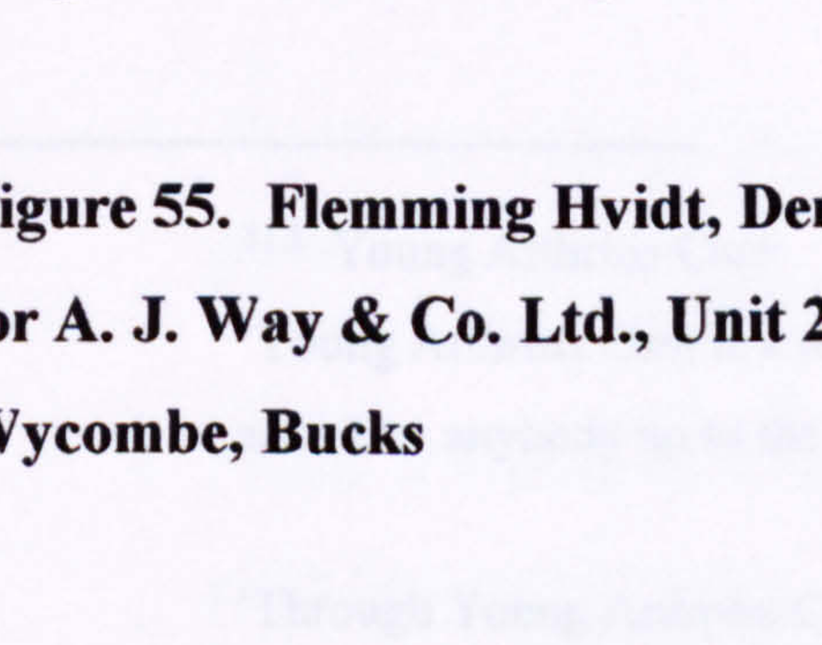

Figure 56. Flemming Hvidt, Denmark: Young Chair for Hvidt Stolebutik, Classengade 25, 2100 Copenhagen, Denmark.100 Copenhagen, Denmark.

10.3 Primary research: postal survey

10.3.1 Introduction to the surveys

Two surveys were conducted to gather primary source material from users and practitioners. Each have opinions that could influence the seating criteria so it was important to retain the individual nature of their comments, anecdotes and personal preferences expressed.

10.3.1.1 Postal seating user survey

The Seating User Survey was vetted by a regional co-ordinator and distributed through a Young Arthritis Care group. (Anon.)[313] (see **Postal seating user survey** in the **Appendices.**)

---

[313] Young Arthritis Care:

'Young Arthritis Care is a self-help support group run by and for all young people with arthritis - anybody up to the age of 45.' (Anon)

'Through Young Arthritis Care you can -

- get to know other people in similar situation to yours
- share experiences and problems with people who really understand what you're talking about.
- get information and advice
- help to raise public awareness of the problems faced by young people with arthritis.'

'Arthritis Care is a national voluntary organisation which acts for and with people of all ages with arthritis and rheumatism.

Young Arthritis Care is constituted as a Special Group managed by its own National Committee by working with and within Arthritis Care.'
(Date of publication not given) Young Arthritis Care: Action for People with Arthritis, self help leaflet

10.3.1.2 Surveys pilot tested

The surveys, as with the testing procedures, were 'pilot-tested' before being carried out. Highlighting any amendments necessary and optimising the input of those people who were willing to assist my research.

10.3.1.3 Annotated Results of user surveys

(See Comments made on postal seating user survey in Appendices)

My primary research includes a questionnaire of seating habits from a sample of 100 people from Young Arthritis Care - This is a national self-help organisation of people with arthritis. For brevity, I have annotated the results of the seating survey to the two most frequently recorded answers:

- A postal survey was sent out to 100 members of Young Arthritis Care - 47 responded: 41 female & 6 male, grouped between 14-54 years old. (Using YAC's age limit up to 45 years)

- The two most frequently recorded types of arthritis were rheumatoid then osteo.

- People tended to have had their arthritis for only a few years, banded 0-4 years then between 5-9.

- Joints affected by arthritis (listed in order of frequency): knee, hand/s, foot/feet, hip/s, shoulder/s, elbow/s, wrist/s, neck, back.

- The time of day when arthritis is worse was early morning followed by late evening.

- When joints ache people will warm them, sit down & relax.

- The type of seat the respondent usually used was an arm chair & settee.

- This was also considered to be a favourite chair.

- Number of arm chairs people have: 28 had two, 12 had one.

- Number of settees/couches people have: 34 have a three-seater, 13 have a 2-seater.

- The types of chair avoided are principally low or low & soft chairs.

- Only 9 people had therapeutic chairs of any description, 2 used to have.

- The two most popular activities done whilst seated, during leisure time,

- were watching television and reading.

- Number of people in household who would sit and relax during leisure time: Two or three.

- the features thought desirable with domestic seating were arms and a place for a cup.

- The two main upholstery details listed were to have: washable covers and loose cushions that matched their decor.

10.3.1.4 Findings from Annotated Surveys

Design criteria, appropriate for seating for younger people with arthritis, were drawn from a synthesis of the **Results of the seating survey,** the **Occupational Therapists questionnaire replies,** in the **Appendices,** and the **Contextual research**

10.3.2 Statistical analysis of the postal survey data

10.3.2.1 Method

The raw data from questionnaire results was collated from the Postal Survey into a Microsoft Excel spread sheet (see **Appendices 9.1.1**). The data was then entered into SPSS (A Statistical Program for Social Scientists) Using cross tabulations.

The data was analysed using Fishers exact test[314], since many of the 'expected' numbers were too small for the chi-square test for independence to be valid

This type of analysis was chosen because it 'concerns category-variables rather than quantity variables'. (Rowntree, 1981)
Many comparisons where made and these analyses are included in the appendices.

Results were not drawn from 'fishing' through data looking for unusual figures. Because it is said that 5% of all 'tie-ups', indicating statistical significance, can appear by chance.

[314] Developed by Sir Ronald Fisher

10.3.2.2 Explanation for grouping of results

Thirty-three analyses are documented in the following section and in the Appendices **(10. Statistical Analyses: Fishers exact test)**. The results are grouped according to their P-values, giving more prominence to those with a lower value, and a statistical significance.

Looking at the P-values, there are three natural groups: those up to .201, between the range of .283 to .863 and those at 1.000. These can be seen from the following summary tables.

The analyses from .283 upwards are in the Appendices **(10.1 & 10.2)**.

10.3.2.3 Summary table of analyses P-values up to .201

variable a	variable b	P-value
middle back	loose (cushion)	.004
arms	knees	.051
head rest	middle back	.110
foot rest	top back	.127
lower back	loose (cushion)	.127
recliner	top back	.201

10.3.2.4 Summary table of analyses P-values between .283 to .771

variable a	variable b	P-value
arms	hands	.283
top back	loose (cushion)	.339
arms	elbow	.351
head rest	shoulders	.394
Foot rest	Neck	.528
RHEUM	Arms	.531
head rest	top back	.537
OST	arms	.538
HTNUM	high seat	.546
foot rest	shoulders	.559
recliner	lower back	.683
hands	somewhere cup	.708
neck	loose (cushion)	.746
arms	shoulders	.757
OST	high seat	.762
HTNUM	high back	.763
foot rest	lower back	.771
head rest	lower back	.771

11 (See **Appendices 10.1**)

11.1.1.1 Summary table of analyses P-values at 1.000

variable a	variable b	P-value
recliner	neck	1.000
recliner	shoulders	1.000
recliner	middle back	1.000
foot rest	middle back	1.000
head rest	neck	1.000
HTNUM	low seat	1.000
shoulders	loose (cushion)	1.000
high seat	early am	1.000
RHEUM	high seat	1.000

(See **Appendices 10.2**)

11.1.2 Justifications to proceed with case study & prototype -postulate (4)

- There is a need for seating which meets the outstanding functional requirements of people with arthritis and to be acceptable in the home.

- A seat which promotes a good posture can be restful. By supporting painful joints a domestic seat can be used as part of a pain reduction regime and can avoid contributing to further joint damage. Comfort can be synonymous with easing pain

- Creatively designed seating and accessory furniture can offer choices and a sense of control by making provisions for seated activities as well as providing a place to rest.

11.1.2.1 Seating design brief - postulate (5)

The following postulates underpinned the design development process, in design they are known as the design brief:

- Products, that cater for a wide range of physical ability, can satisfy functional requirements and be acceptable and appropriate to the user;
- Products can be designed in response to observations of human behaviour, habit, posture, need and desire;
- By involving a sample group of users with a broad range of abilities in the design process the product is more likely to accommodate a larger percentage of the population;
- A flexible design approach can accommodate different experiences and types of mobility;
- An understanding of different types of mobility can inform the design of seating.

12 Design development

12.1 Introduction to the design development process

Designing is a practical process consisting of various stages: product design specifications, sketch development ideas in the form of drawings, models, mock-ups and test rigs. Construction drawings were produced when the majority of the design research was been done, from which the finalised prototype (Collins, 1964)[315] designs were made. Design ideas developed at various stages of the process were shown to people from the user group in design meetings.

12.2 Design outline for domestic seating for young adults with arthritis

The following points lead on from Oborne's (1982)[316] general list of what a chair should be and specifies (Barnes, K., 1967)[317] the design details for domestic seating for younger people with arthritis:

---

[315] Prototype:
"An original, or model from which anything is copied; a pattern"
Collins (1964) Dictionary, Westminster

[316] '1. the type and dimensions of the seat are related to the reason for sitting.
2. the dimensions of the seat should fit the appropriate anthropometric dimensions of the sitter.
3. the chair should be designed to provide support and stability of the sitter,
4. the chair should be designed to allow the sitter to vary his posture, but the fabric needs to resist slipping when there is fidgeting,
5. backrests, particularly prominent in the lumbar region, will reduce the stresses on this part of the spinal column and
6. the seat pan needs sufficient padding and firmness to help to distribute the body weight pressures form the ishcial tuberosities.' p174-5

'Arm rest height: easy chair 21-22 cm above the compression seat.' p175-9
Oborne, D.J. (1982) Ergonomics at Work, Wiley:,

[317] '...function as it applies to the industrial designer today, is a very difficult concept to describe and that in its broadest sense, it involves our whole view of what society should be like.'

- The design must accommodate different peoples' experiences of arthritis, a potentially fluctuating condition, and suit the way that individual's manage these consequences in their daily life.

- Explore ways that the seating can offer choices and a sense of control when it comes to maintaining a good posture and providing a place to rest and relax.

- It must be comfortable, i.e. allowing easy changes of position. Encourage a generally good posture and provide local supports which can be adjusted according to an individuals need, i.e. to the feet, knees, back, neck, arms and hands, or removed and stored when not needed.

- It should be a suitable place to spend time on a 'bad day', as an alternative to going to bed.

- The design should provide warmth when its needed: through the use of materials and upholstery, options of loose cushions, according to the season. Perhaps stored under the seat.

- The seating must be appropriate for a domestic setting. Considering size and scale, material finish and whether it should be a one seater or two.

- Consider the space around the seat, to avoid tripping over the legs and knocking into the armrests, etc. Avoid having feet that splay out. Consider the furniture's outline: no sharp corners.

- Provisions should be made for activities such as reading, writing and eating, with surfaces to lean on and put a cup. A heat resistant surface for hot cups and plates.

Baynes, K. (1967) Industrial Design and the Community, London: Lund Humphries, p26

- Short term storage would be useful for papers, books, tissues, and medication.

- If the seat is to be a piece of furniture that someone could have for a large part of their life, consider the potential for the product to 'last' and to be easily changed, e.g. by reupholstering.

- Both sets of prototypes should cost no more than £800 to produce. (Detailed marketing information is needed to define a finished product price. However, during the testing process, users gave their opinion on how much money they would pay to purchase the furniture.)

- The materials used should comply with safety standards commensurate with domestic use.

- BSI: Fabric
    - Breaking strength, BS 2576: 1968 (1986)
    - Tear strength, BS4948: 1973 (1982)
    - BS 5852: Part 1: 1979 Fire tests for furniture, Part 1 Methods of test for the ignitability by smokers materials of upholstered composites for seating.
    - BS 5852: Part 2: 1982 Fire tests for furniture, Part 2 Methods of test for the ignitability of upholstered composites for seating by flaming sources.
    - Martindale rub test

- The gas stem should meet the required regulations. (Abbot, 1987)[318]

---

[318] 'In the early 1980's there were a number of accidents caused by a design fault in adjustable swivel office chairs. The type involved had the seat mounted on a central column, with a gas-operated springing system to give up and down movements. The compressed gas cylinder contained a pressure of 40 bars, with a side-entry lever to control the vertical movement at a touch. The danger arose when the cylinder fractured at

the point at which the lever entered, causing an explosion as the pressure was suddenly released.'

'Since January 1984 the only type of adjustment lever permitted for gas operating systems was top-entry; new standard DIN 4550/51, was introduced.'

Abbott, H. (1987) Safer by Design - the Management of Product Design Risks Under Strict Liability, first edition, London: Design Council, p120-1

12.3 Sketch development

12.3.1 Upholstery ideas

Sketch development work, started with an ubiquitous timber institutional chair working on an idea of a wrap & adjustable cushions.

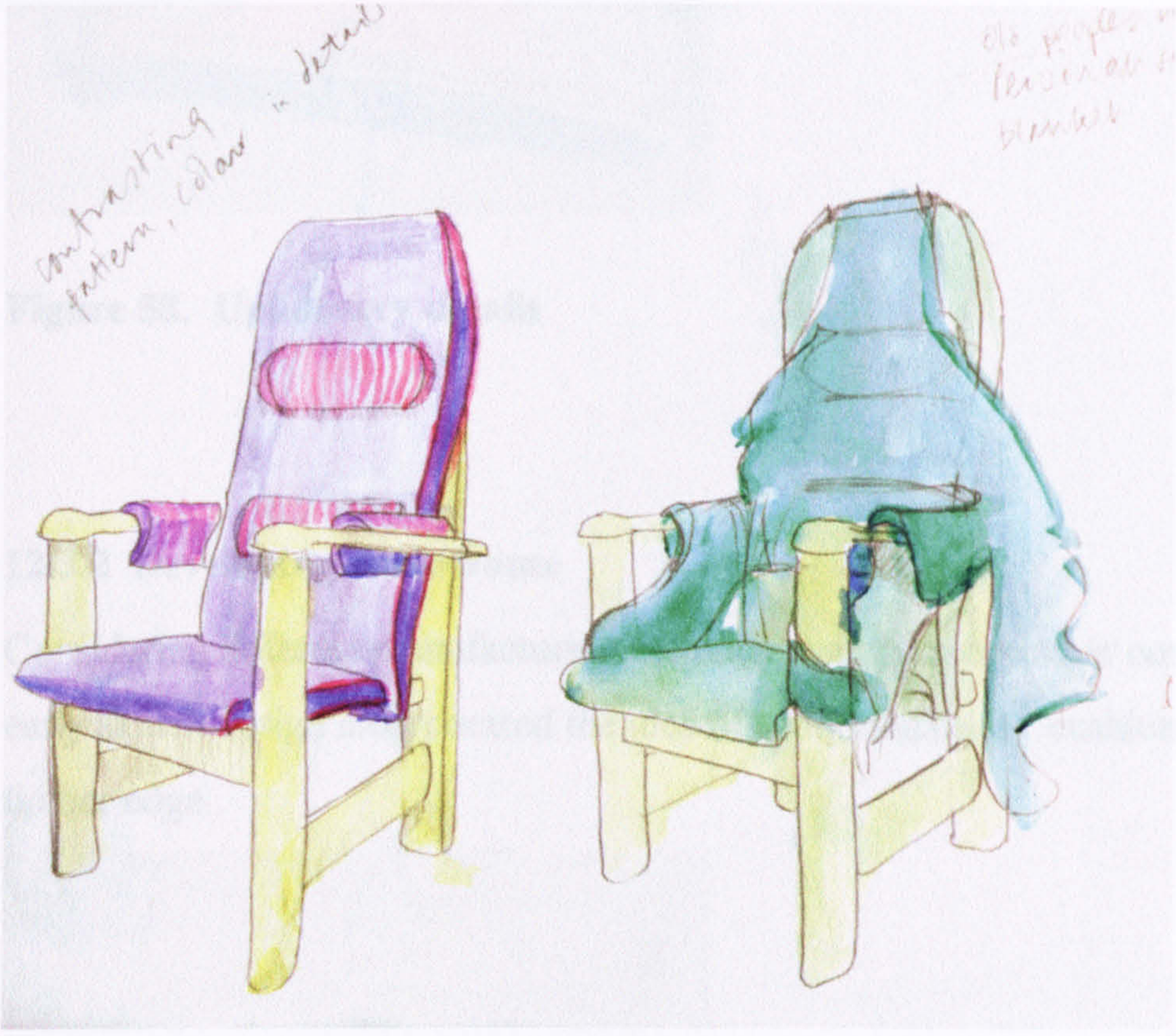

Figure 57. Wrap & adjustable cushions

The wrap was to counteract the cooling that people who sit for long periods of time experience. The two adjustable cushions fit into lumbar area and the curve of the neck to support the full length of the spine.

Meanwhile looking at upholstery details: layers of different densities, World Wide standards, relating to its wear and flammability, were consulted.

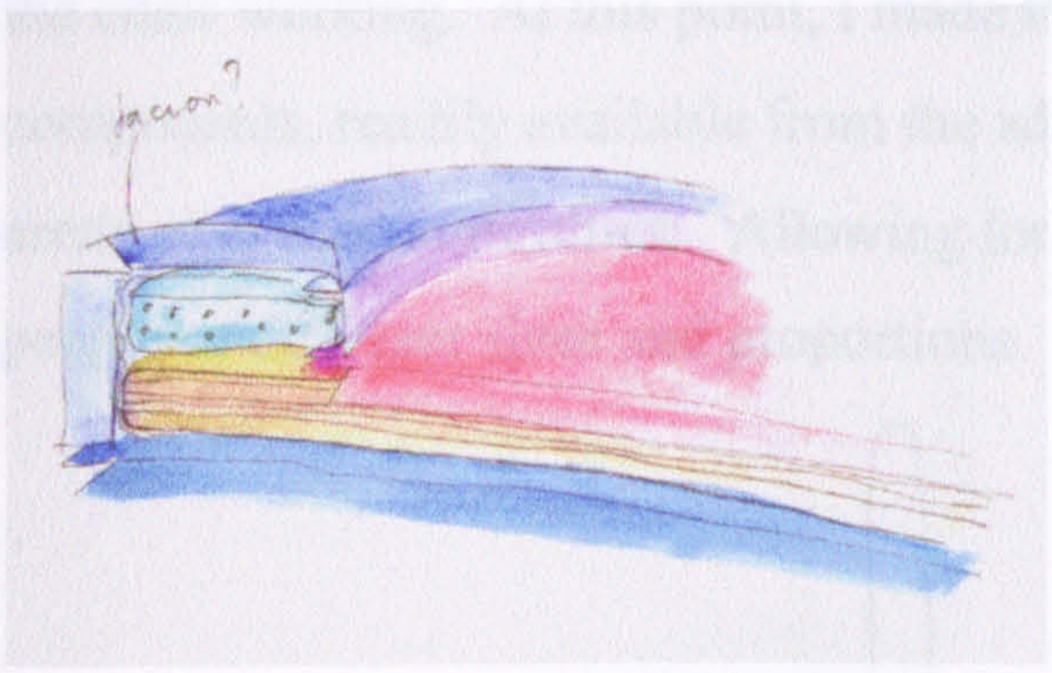

Figure 58. Upholstery details

12.3.2 Developing chair frame

Considering different manufacturing methods, using board timber construction, an early sketch design incorporated the idea of sumptuousness: cushions spilling over a timber edge.

Figure 59. Sumptuousness: cushions spilling over a timber edge

By working on the upholstery, wraps and cushions I could see these would be important elements. But the chair frame was the underlying feature which was key to the chair working. At this point, I made the design decision to transfer standard components, readily available from the adjacent contract furniture industry into the arena of domestic furniture. Allowing for an easily adjustable frame which could suit people of different sizes and proportions.

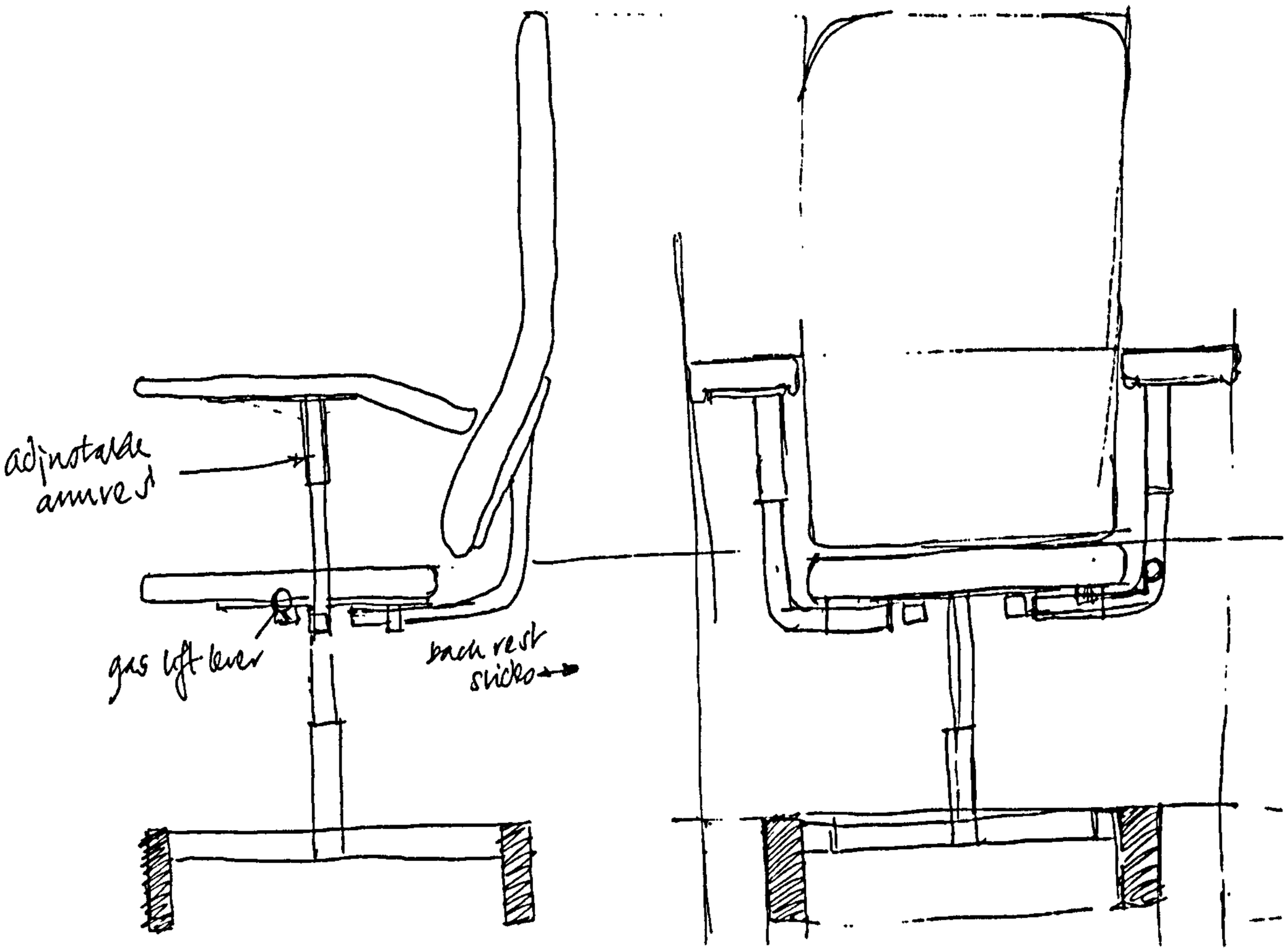

Figure 60. Extract of chair frame drawing

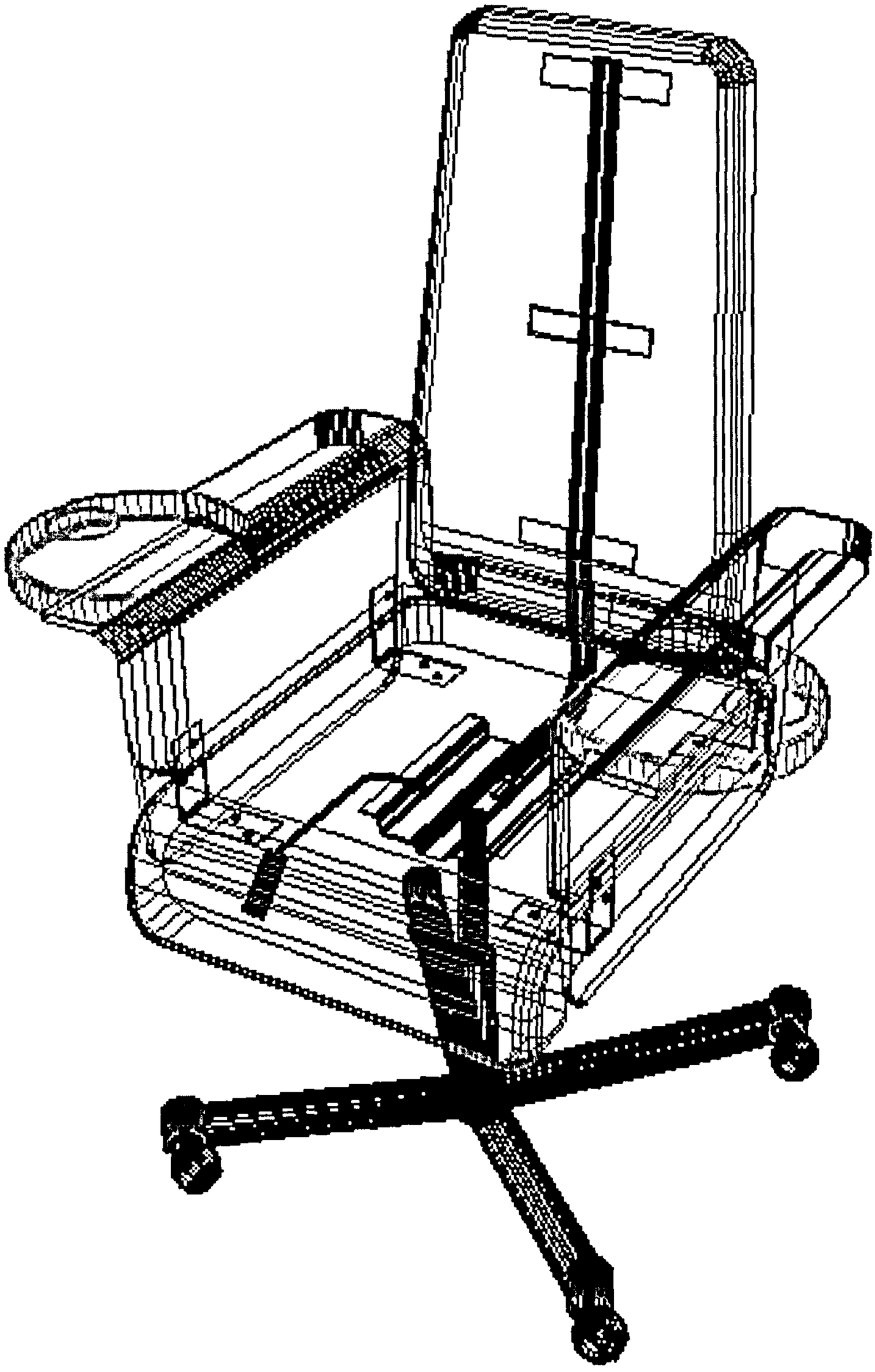

Figure 61. Extract from wire-frame drawing of chair

12.4 Design meetings

Throughout the development phase people from Young Arthritis Care were consulted as to the appropriate nature of the design drawings, models, mock ups and finally the prototypes.

12.4.1 Lifestyle indicators

12.4.1.1 Constructing a common profile of 'young adult with arthritis'

With the results of the seating survey, with the 100 respondents from YAC, the design of the furniture could be based on the compiled common criteria. Salient points were extracted via frequency charts to indicate design features. By doing the same with the information collated about the people themselves a profile was constructed using the most frequently occurring results arising from the questionnaire. These described a group that was most likely to consist of:

> women, aged 25-45 years, who would prefer an armchair - with a high seat and back, arms, head and footrest. It should be upholstered with patterned fabric, have a removable cover which should be washable and with loose cushions. The design should include features such as: a reading facility, a place to keep a TV remote control and a surface for a drink (heat-proof, wipe clean).

12.4.1.2 Profile used to assist the definition of aesthetic

The profile of a young adult with arthritis acted as a market segment, providing some clues as to the user's preferred appearance for the furniture being designed. The group described, i.e. women, aged between 25-45 years, mirrored the readership profile for a selection of lifestyle magazines, so a series of mood boards were compiled, using images from these with fabric swatches.

The mood boards where presented at a design meeting where participants tended to prefer the options with which they were familiar and comfortable.

12.4.1.3 Lifestyle indicators and a 'consensus of taste'?

One assumption made was that, by using mood boards, it may be possible to arrive at a consensus of taste. However, it only served to show how diverse individuals were and how personal taste differed. It is not possible to design by committee. In fact, the limited budget available for the prototype did more to narrow aesthetic options of the furniture.

12.4.1.4 Peoples' anecdotes more useful than abstraction

In order to reduce the complexity of information about the potential user group, I created a hypothetical profile. However, this compilation of frequencies was not real. I fell into the trap highlighted by Mitchell(1993).[319]

The most valuable information after the respondent's simple expression of preferences, i.e. preferring an armchair to a settee, were the anecdotal comments people jotted down. These 'one-liners', because of their narrative content, were easily retained during the design phase. The suitability of design details were judged by recalling observations of individuals, their comments, rather than dwelling on hypothetical abstractions.

12.4.2 Criticisms of design meeting led to design change

There was a feeling that the furniture was in danger of becoming a 'Chitty-Chitty-Bang-Bang' creation. It was trying to do too much.

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[319] 'The proper business of design research is to design ways in which user needs and wishes may become the central focus of the design process - not simply to report the mistake of the moderns, as environmental-behaviour researchers do, by substituting representations of abstract users from the theory of the universal man...' Mitchell, C.T. (1993) Redefining Designing: From Form to Experience, p62 & 68

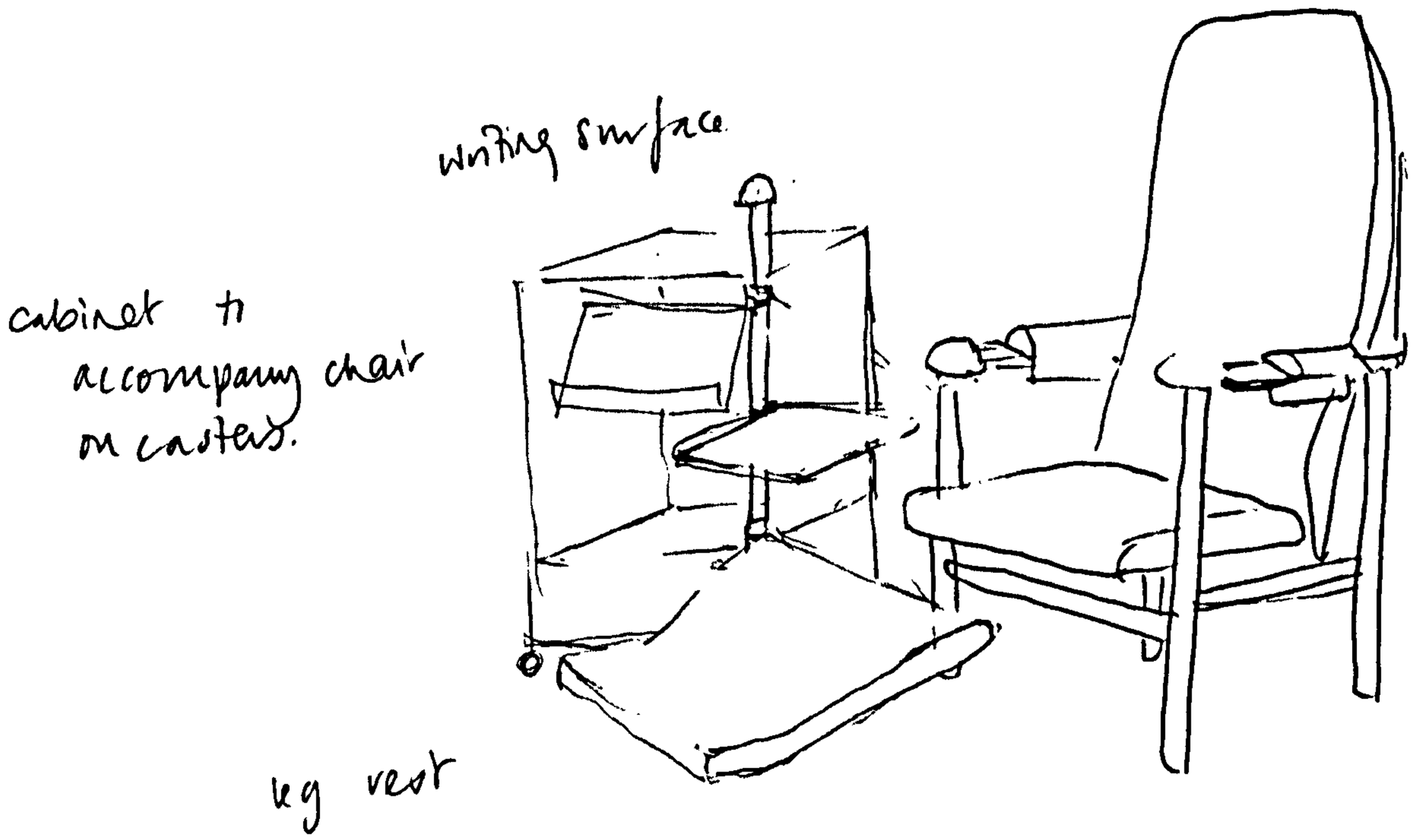

Figure 62. Concept drawing of a cabinet containing: footrest, work surface and book rest

So with this in mind the product design specification was adapted to separate the design into a 'family' of strongly recognisable pieces of furniture: A chair, footrest and cabinet, with separate wrap in the form of a day blanket and adjustable cushions. Aiming to connect the pieces functionally, but also that the pieces should carry through a resemblance in detail and scale so that the pieces relate to each other.

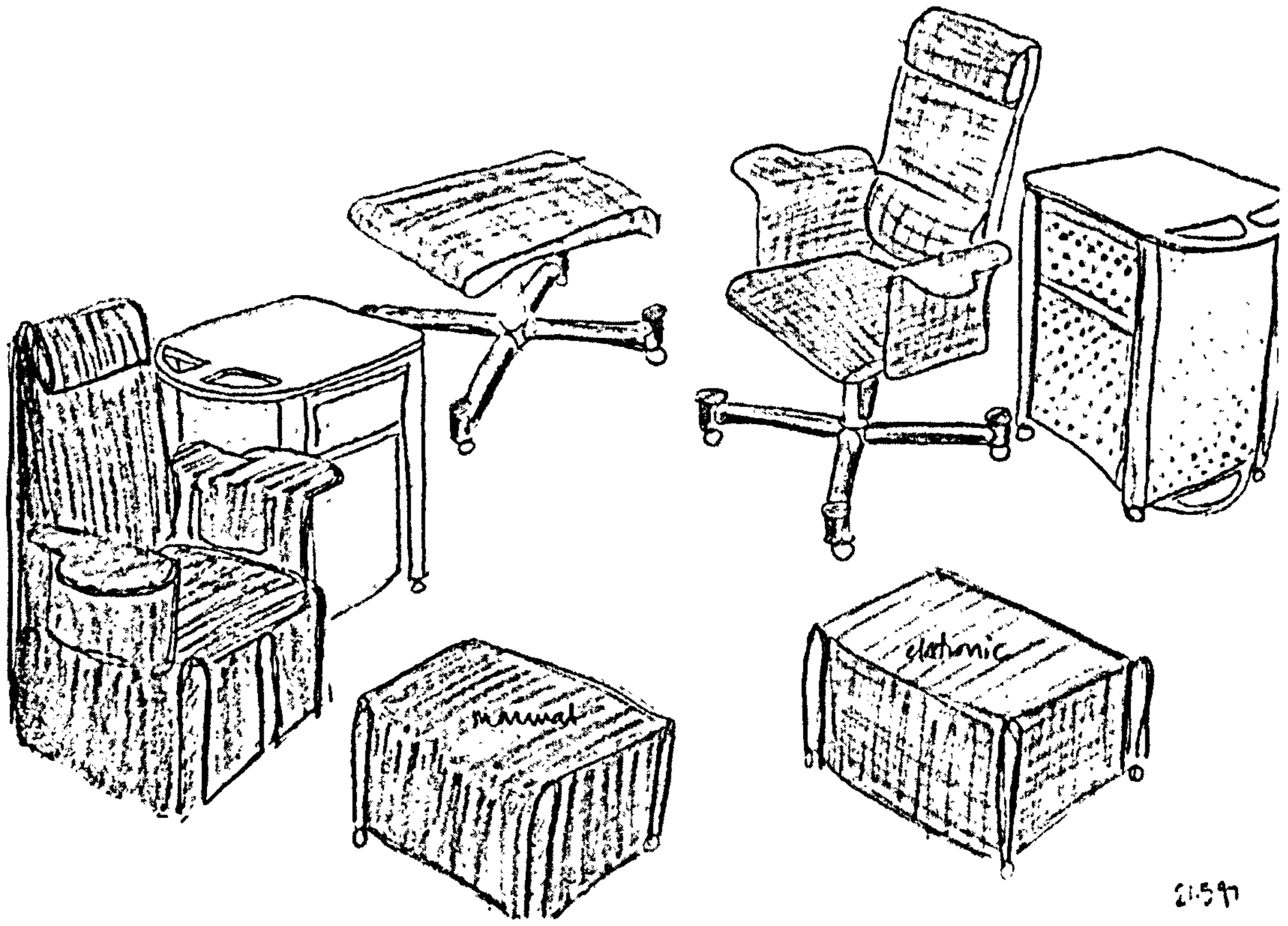

Figure 63. A family of pieces

12.4.3 Designs for cabinet

The cabinet was developed to accompany the chair and footrest to store people's belongings used throughout the day. Several people stressed the importance of keeping their mobile-phone and telephone numbers close to hand, as well as television remote control, cigarettes, etc.

The sketch of the cabinet illustrates the process of making the forms more readily identifiable: By considering the cabinet a relative of the chair and footrest, I designed a version with a similar base arrangement.

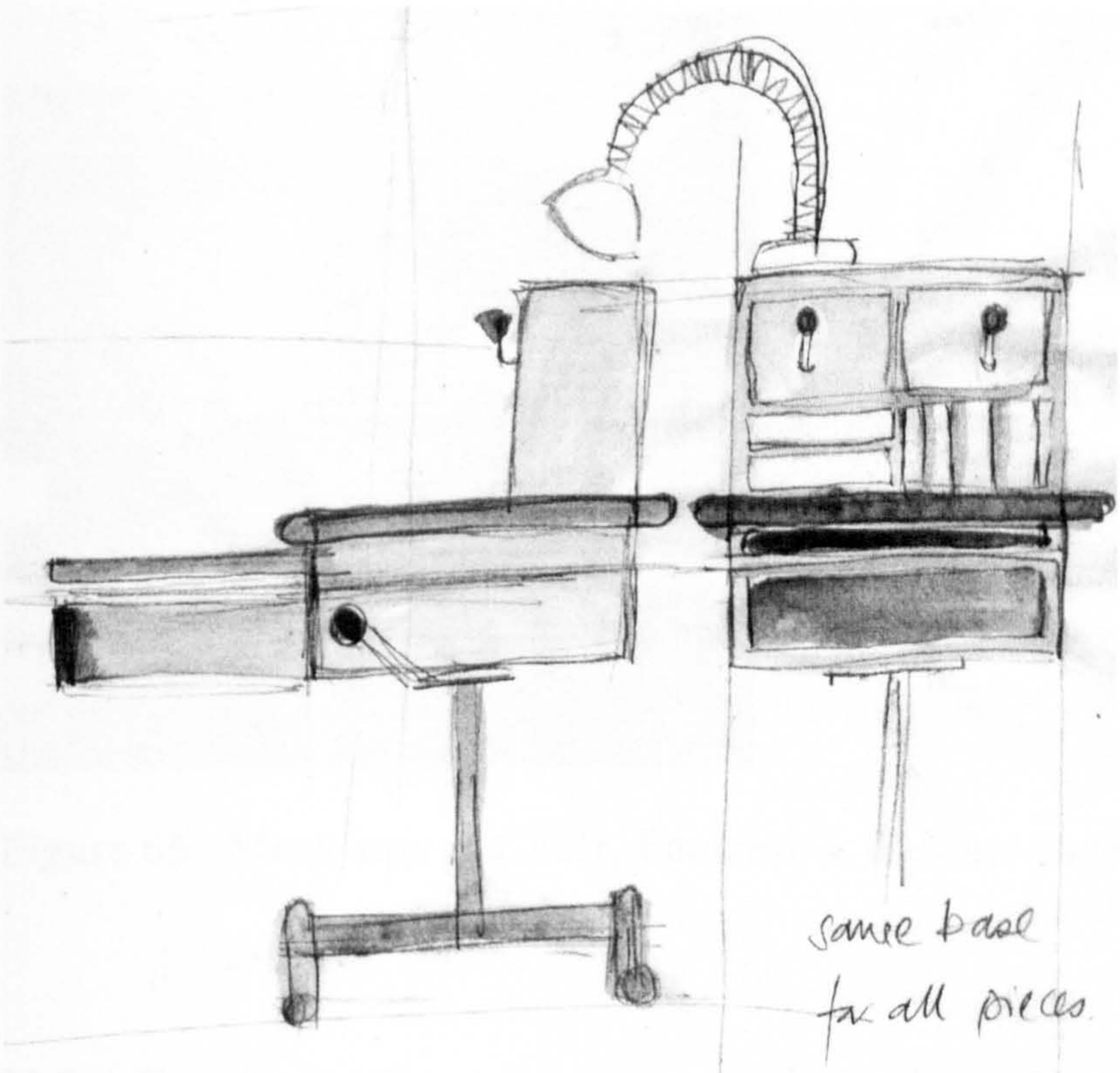

Figure 64. Concept drawing of cabinet with gas stem and four star base

12.5 Mock-ups

Mock-ups are simulations of the designs although not necessarily made as they would be on a production model. In some instances paper & card representations suffice. Mock-ups were used during the next set of 'design meetings'. Thirty seven people tried the mock-ups: they were mainly able bodied; 7 people had physical impairment of some sort; nine were Occupational therapists; 22 female and 15 male.

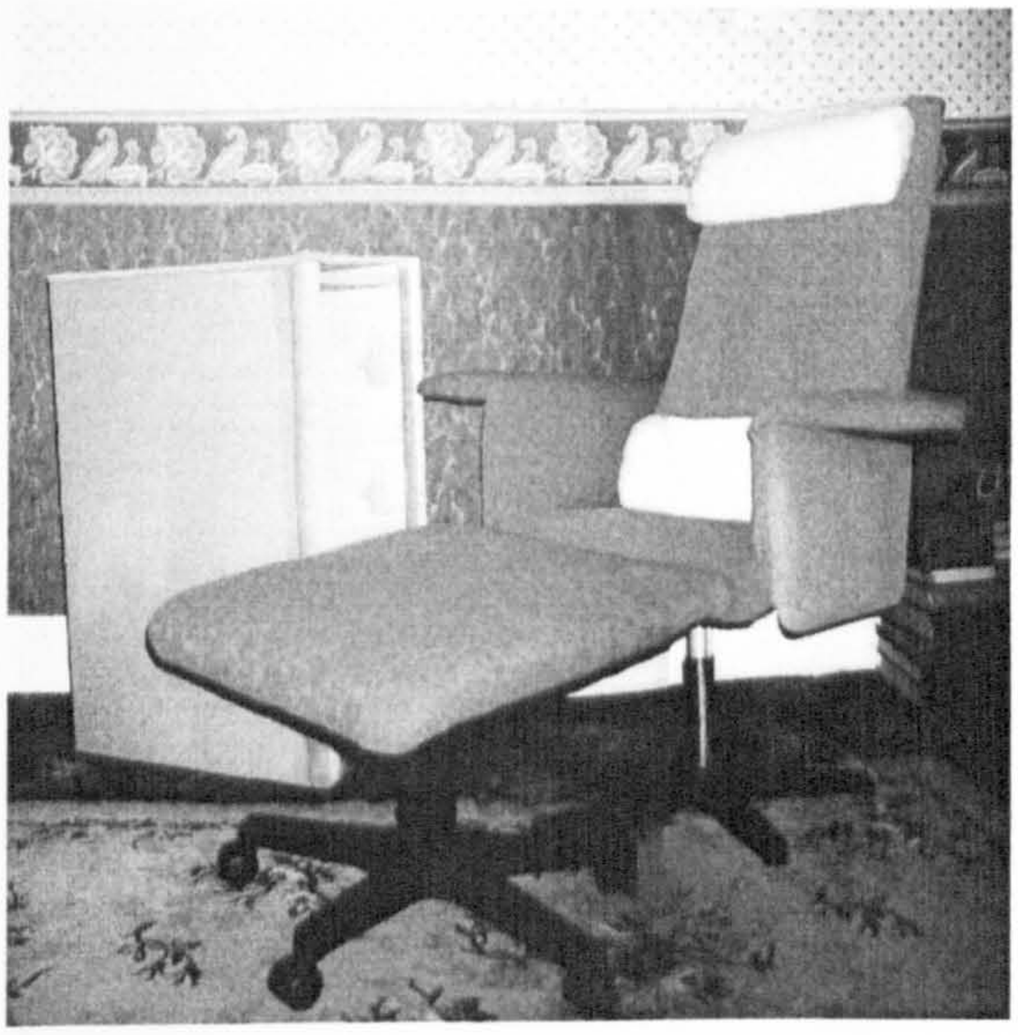

Figure 65. Mock-ups of Chair, Footrest & Cabinet used in Design Meetings

12.5.1 Developing the arms on the mock-up chair

From the questionnaire, the most frequently requested design feature on the chair was the arms. As the shape of the arms were developed a place to put a cup was incorporated.

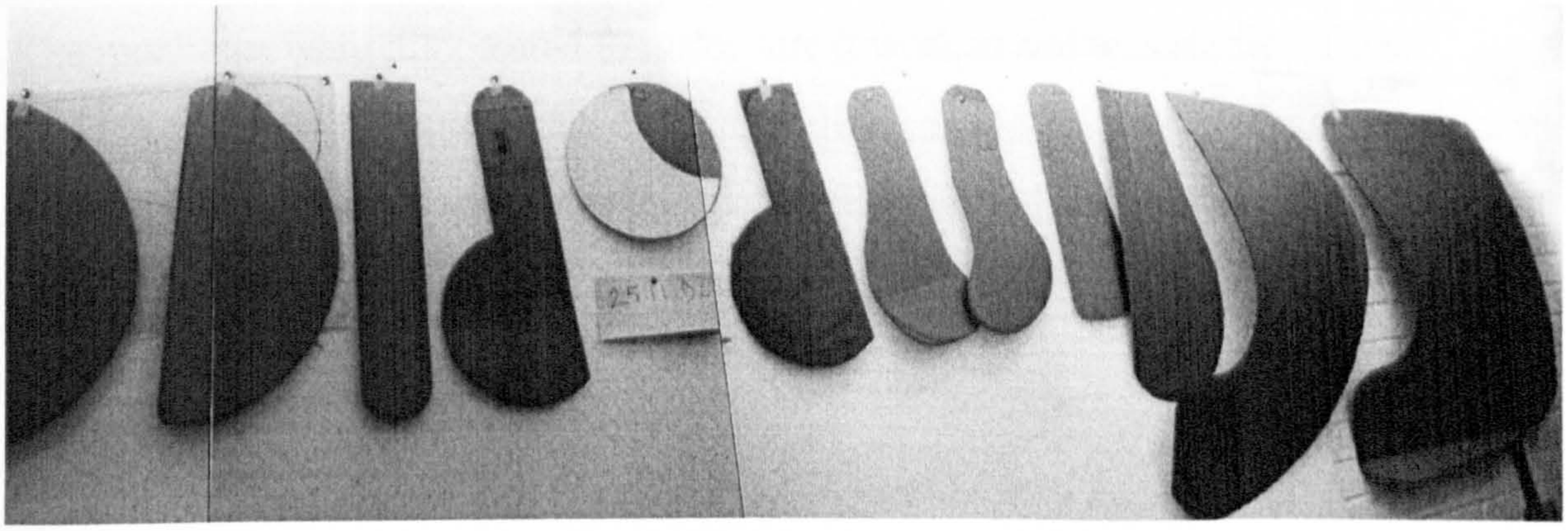

Figure 66. A series of card profiles were used to determine form of the arms

Figure 67. A place to put a cup

While constructing the arm rest on the mock-up, it was possible to see that if the arms could pivot out of the way to cater for someone making a side transfer from a wheel chair.

12.5.2 Pilot testing mock-ups

The mock-ups were pilot tested to make sure it worked and was stable. These consisted of a chair, footrest and cabinet, to demonstrate the design ideas and obtain feed back from various user groups. Pilot testing was helpful to the testing programme.

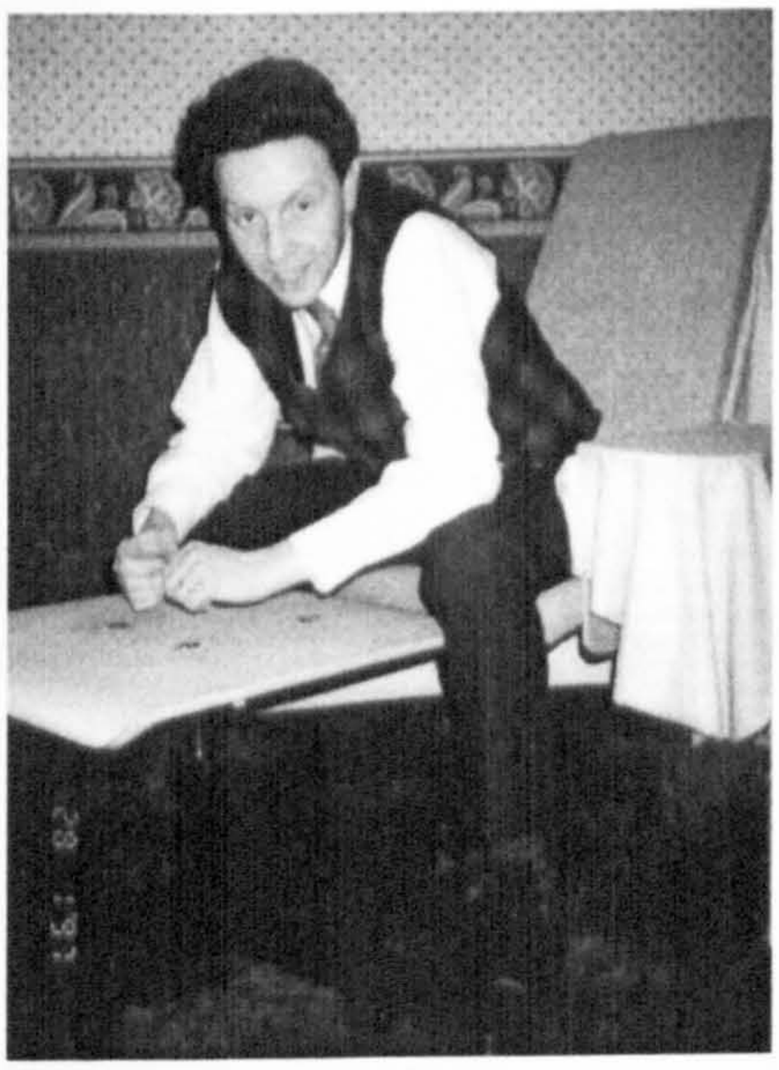

Figure 68. Pilot testing mock-up

12.5.3 Design meetings with full size mock-up

Aspects of the designs were debated and the furniture was tested for size, comfort, and appropriateness. Results drawn from these meetings fed back into the design of the furniture and the production of prototypes (these are models of the production version)

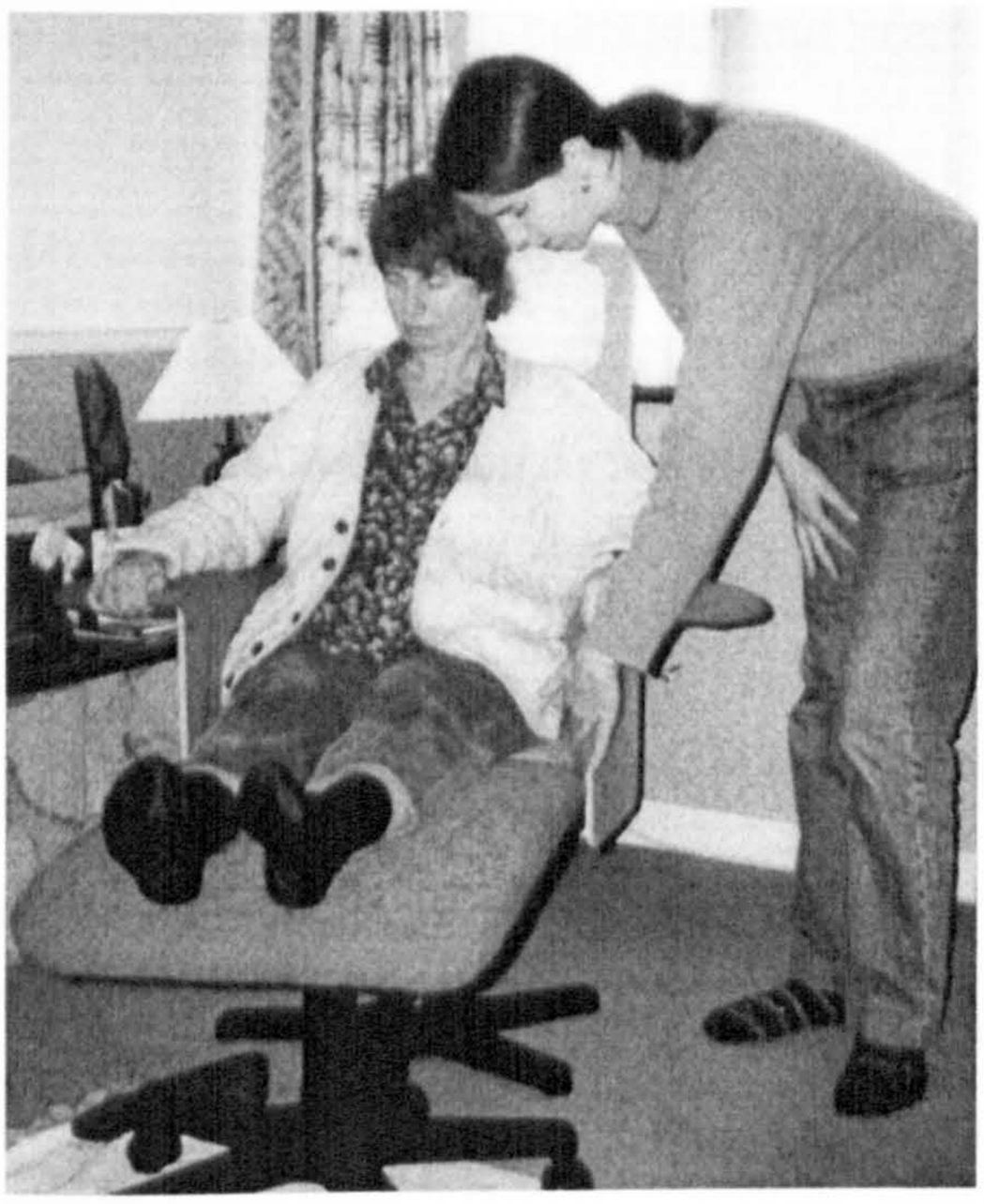

Figure 69. Design meeting held at a participant's house to test mock-ups of the furniture

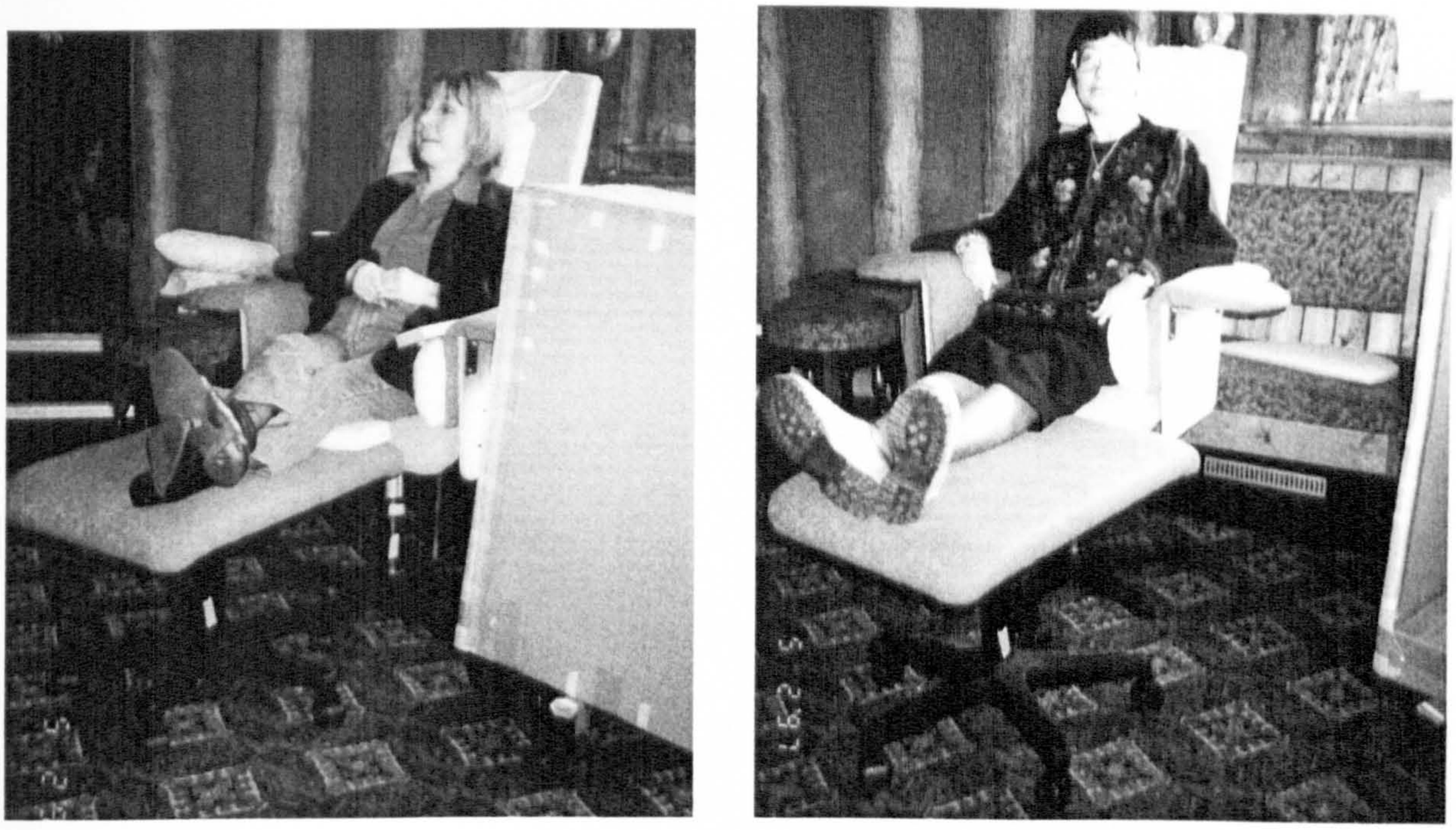

Figure 70. Design details debated in a neutral environment.

Design meetings were where a group of product users tried various mock-ups of the chair, footrest and cabinet. Some of the mock-ups were ready representations of the final product, i.e. a cardboard representation of the maximum capacity for the cabinet. Feed back from this was that it would be better to use the accessible space, (i.e. not the section nearest the ground) and keep it looking like a 'normal' cabinet.

Transcripts were made of these meetings and these are in the **Appendices.**

Transcripts of design meetings: Transcripts of family & friends meeting 8/9.2.97, Transcripts of design meeting with J&M, Transcript of design meeting at Ladybridge, Tamworth and Transcript of visit to Z's house, 27.2.97. A Selection of extracts from these transcripts have been collated in **Selected comments made during pilot testing & design meetings testing mock-ups**

12.5.4 Evaluation of the mock-up: changes for the prototype

- Both the chair and footrest bases were fabricated rather than using the contract, moulded plastic, five star bases.
- The arms were not completely upholstered by request, instead the ends were timber.
- The depth of the seat and back upholstery was greater.

- Casters were added to allow for moving/cleaning
- The gas stem was longer and a non-swivel variety.

12.6 Prototype construction

12.6.1 Working with prototypes

When furniture is produced its functionality is tested: for stability, use of materials and suitability of components. These tests can be done in a laboratory situation (Galer & Harris, 1981)[320] using defined standards. (BSI, various dates)[321] Various elements can be simulated and stress analysed by modelling them on a computer.

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[320] 'Ergonomic Product tests usually take two forms:

1. laboratory tests in which products are tested under controlled conditions.
2. field trials in which the use of products is demonstrated by users in the environments in which they are normally used.

Ergonomics can contribute not only to product evaluation but also the design specification frequently based on the results of product evaluations...'

Galer, M. & Harris, C. (1981) Ergonomics and Rehabilitation Aids, Seminar at the Institute of Consumer Ergonomics, 2nd Dec., p7

[321] British Standards Institute:

BS EN 425: 1994 - Resilient floor coverings determination of the effect of a castor chair.

BS 3044: 1990 - Guide to ergonomic principles in the design and selection of office furniture

BS 4875: Part 1: 1985 - Strength and stability of furniture, Part 1 Methods for determination of strength of chairs and stools.

BS 4875: Part 2: 1985 - Strength and stability of furniture, Part 2 Methods for determination of stability of chairs and stools.

BS 5459: Part 1: 1977 Specification for performance requirements and test for office furniture, Part 1. Desks and tables.

BS 5459: Part 2: 1990 Specification for performance requirements and tests for office furniture, Part 2. Office seating.

BS 5459: Part 3: 1983 - Specification for performance and test for office furniture, Part 3 Storage furniture.

BS 5852: Part 1: 1979 Fire tests for furniture, Part 1 Methods of test for the ignitability by smokers materials of upholstered composites for seating.

BS 5852: Part 2: 1982 Fire tests for furniture, Part 2 Methods of test for the ignitability of upholstered composites for seating by flaming sources.

BS 5940: Part 1: 1980 Office Furniture, Part 1 Specification for design and dimensions of office workstations, desks, tables and chairs.

However, the advantage of working with 'real' artefacts is that it was possible to evaluate the design's suitability with product users. Users experimented with prototypes in their own environment and valuable criticisms arose. This process was analysed in a qualitative manner, paying particular attention to the individual nature of people's comments: their observations and recommendations. (Maykut & Morehouse, 1994)[322] To make a generalisation of this stage, less obvious human concerns surfaced and personal fancies were expressed: the satisfaction of the posture and positioning, the choice of finishes, a sense of 'ownership', appropriateness to lifestyle and the ability to service people's establish habits. These play a part in the selection and purchase of a product, so logically should be considered in the design development.

For these design ideas to be sophisticated enough to manufacture a number of further prototypes are necessary. It is usual to work with several generations of prototypes

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BS 6250: Part 1: 1982 - Domestic and contract furniture, Part 1 Specification for performance requirements for seating.

BS 6250: Part 3: 1991 - Domestic and contract furniture, Part 3 Specification for performance requirements for cabinet furniture.

BS 6261: 1982 Evaluating the appreciation of and interaction between components in upholstered furniture.

BS 7179: Part 5: 1990 Ergonomics of design and use of visual display terminals (VDTs) in offices, Part 5. Specification for VDT workstations (3.6 chair mentions 5 star bases)

BS EN1101: 1996 Textiles and textile products - Burning behaviour - Curtains and drapes - Detailed procedure to determine the ignibility of vertically oriented specimens (small flame)

BS EN 1102: 1996 Textiles and textile products - Burning behaviour - Curtains and drapes - Detailed procedure to determine flame spread of vertically oriented specimens

BS 5866: Part 4: 1991 Blankets suitable for use in the public sector, Part 4. Specification for flammability performance.

[322] 'Qualitative research places emphasis on understanding through looking closely at people's words, actions and records.' Maykut, P. & Morehouse, P. (1994) Beginning Qualitative Research, A Philosophic & Practical Guide, The Falmer Press, London & Washington D,C, p17

(Lewis, 1997)[323], illustrating there are many stages of refinements along the route to production.

12.6.1.1 Two sizes of prototype seats

Two sets of prototypes were made giving the freedom to experiment with different finishes, fabrics and sizes. One with a loose cover the other a tight, fitted cover. The seat of the red prototype was 50mm smaller, in width and depth (from front to back) that the cream prototype. This begins to show two different assembly possibilities and accommodate a range of users.

12.6.2 Design of prototype: aesthetic themes & upholstery details

Once the mock-up structure was found to be viable and functional then the aesthetics of the prototype chair could be addressed in detail.

I looked back to my visual references to Vico Magistretti's horse blanket chair and its skilfully tailored cover. This concept tied in with the criteria to allow the upholstered cover to be easily changed.

Figure 71. Vico Magistretti's Horse Blanket chair

323 'Priestman Goode would expect to be working on the project (a 'small electrical product' such as a camera) for just over a year... Up to 50 cast models produced for product testing and samples for exhibitors and product launch.'
Lewis, J.(1997) Design Week, Free Market, 1.8.97, p15

Aesthetically the chair could be dressed in any outfit. So in order to create a suitable image for the furniture a lifestyle study was done. By matching the most frequently occurring user profile with that of a range of correlating lifestyle magazines, via the readership, a series of mood boards were generated.

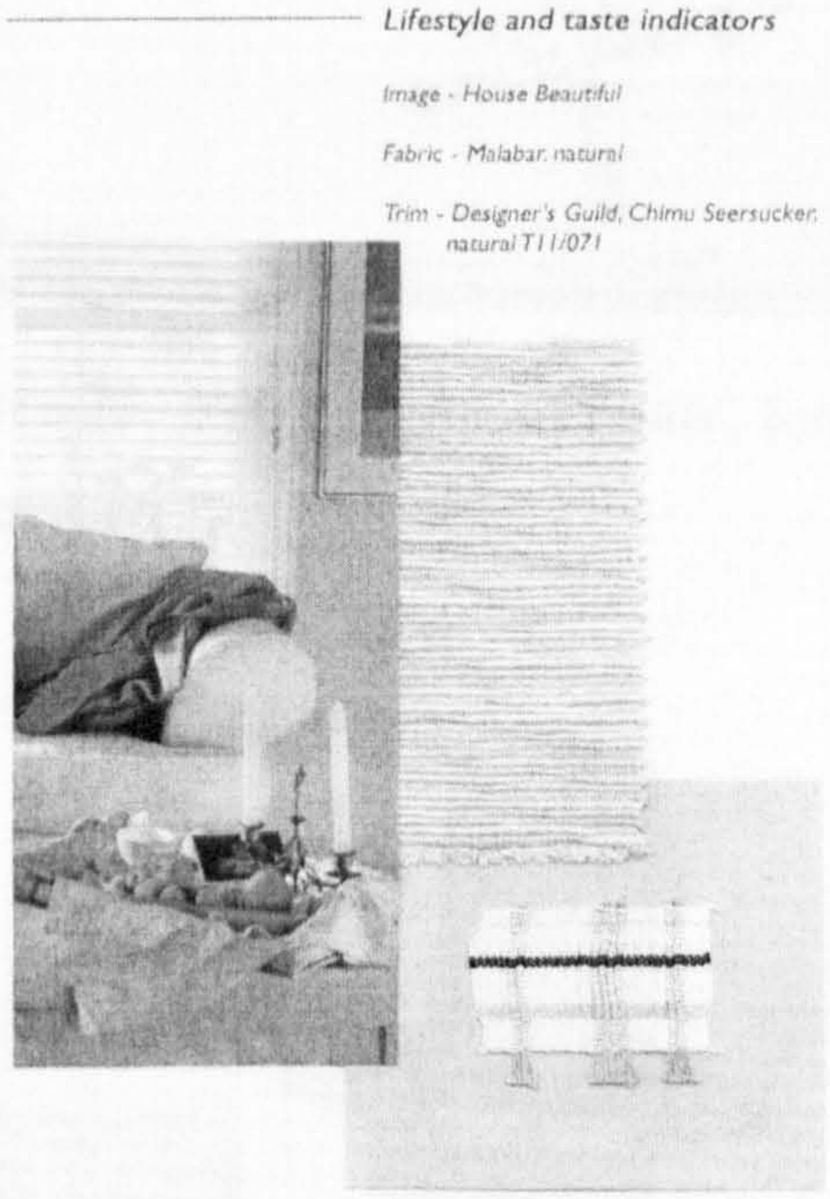

Figure 72. One of a series of lifestyle & taste indicators

12.6.3 Prototype design specification

A prototype design specification was compiled from a synthesis of secondary & primary research. The two main sections are:

User specification (See **Appendices 11.1**), and

Component and Material Specification (See **Appendices 11.2**)

Further design specifications would be expected prior to production of any product.

12.6.4 Design drafting & modelling

In order to make parts of the design working drawings were produced using Computer Aided Design tools. The drawings were used to subcontract the bases to a steel fabricator.

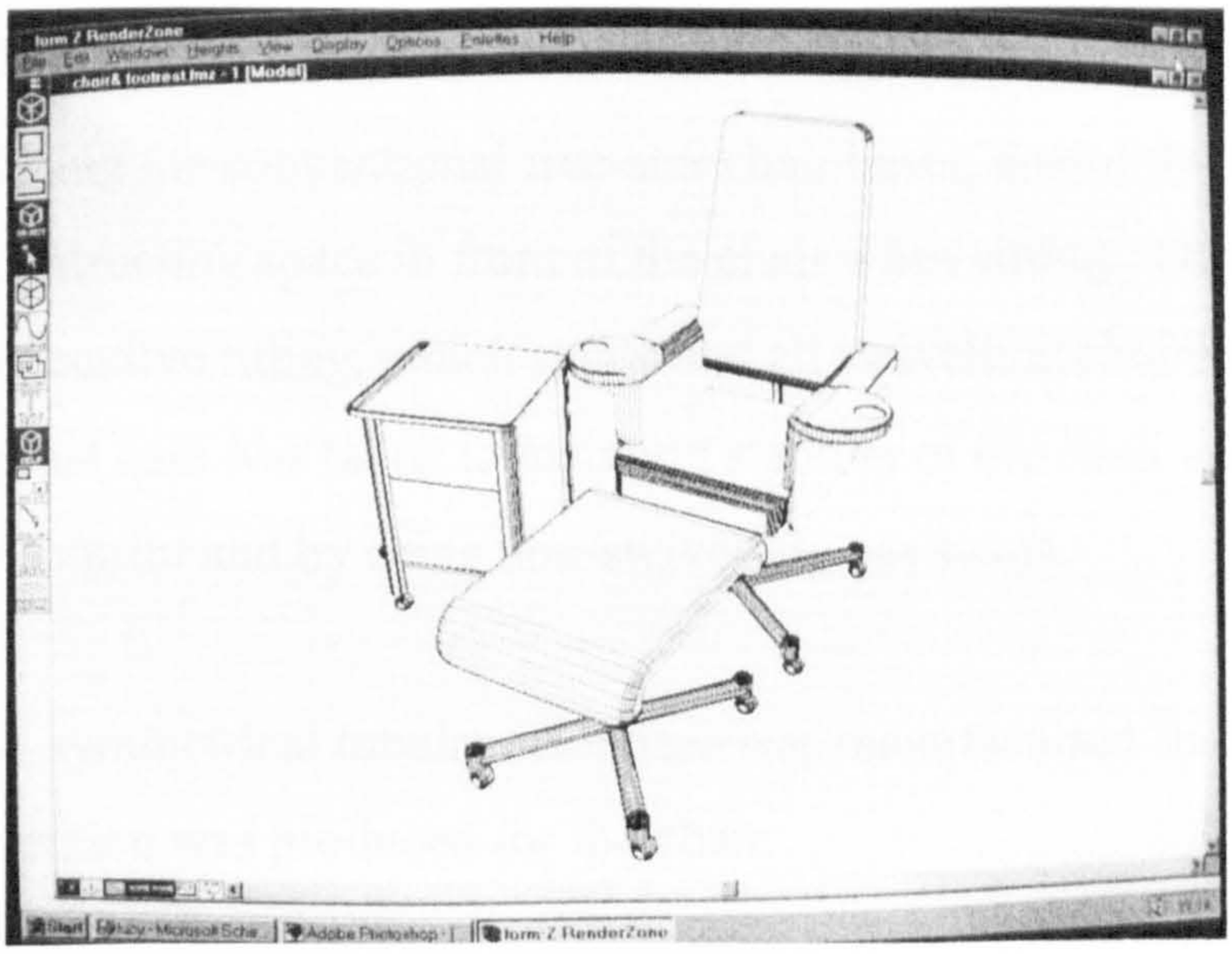

Figure 73. Wire frame of chair, footrest & cabinet drawn in form Z, displayed on screen

Figure 74. Solid model (form Z) of chair, footrest & cabinet

During the making process, many suppliers were contacted for different materials and components. Prototyping, by its nature, involves small orders; so some companies have supplied their products as samples, whilst with others lengthy negotiations are required to buy-in suitable quantities.

12.6.5 Constructing the base of the chair & footrest

Using the conventional five-star chair bases, one of the legs always protrudes obstructing space in front of the chair when sitting. Owing to a health & safety executive ruling, which states that all swivelling chairs ought to have a five star base, great care was taken to maintain stability of the chair and footrest, making it a large footprint and by using non-swivelling gas stems.

A symmetrical tubular steel base was manufactured for the footrest and an asymmetric version was produced for the chair.

Following a design meeting with Z it was felt that a footrest with a remote control rising and tilting mechanism would be useful. Initial investigations were made into one of the prototypes being electronically controlled, however despite sourcing mechanisms, expertise and circuitry, time became the limiting factor.

12.6.5.1 Subcontracting

Owing to the precise nature of the footrest's welded joint: four horizontal tubes to a vertical taper, the bases were subcontracted and produced by an engineering company in Derby.

The general arrangement drawing below was used. As Dormer (1995)[324] emphasises the process 'involves team work, forward planning and excellent standards of communication.'

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[324] 'If you are a designer of furniture that is to go into quantity production then at some stage you have to decide that your involvement in designing the furniture is complete and that you have provided enough information for the furniture to be produced by other and that these others are competent enough to produce it. Designing here involves team work, forward planning and excellent standards of communication.'
Dormer, P. (1995) Furniture Today, Crafts Council: London, p12-13

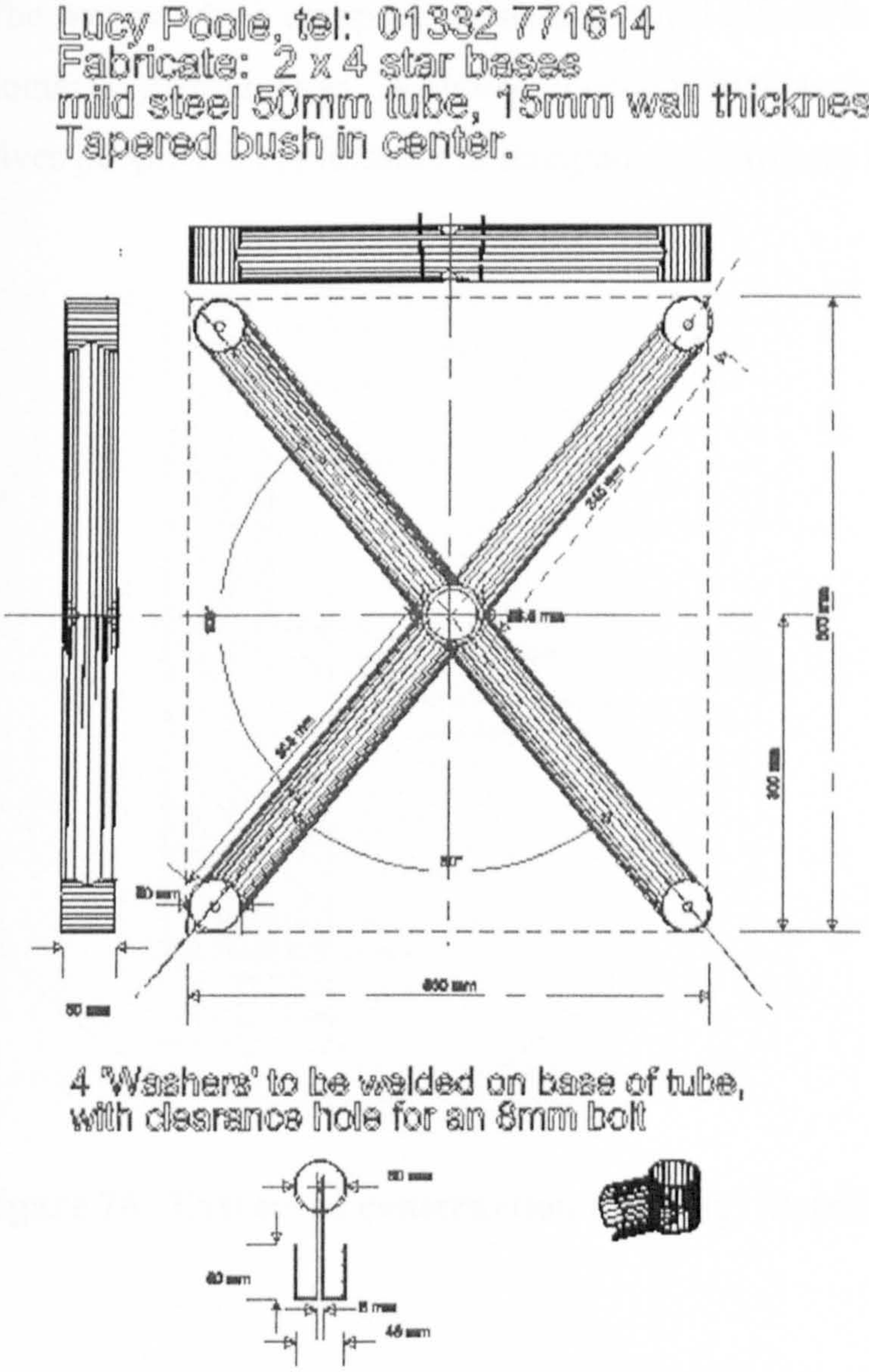

Figure 75. General arrangement drawing used by subcontractors to produce footrest bases

Bought-in components and mass production technology were married with a small batch production type assembly. (Dormer, 1995)[325]

[325] '...a chair can make use of mass produced technology - think of the screws and adhesives used, as well as the tools employed in the making - whilst itself being one of a small batch or even a one-off.' p13
Dormer, P. (1995) Furniture Today, Crafts Council: London

The way in which components are combined affects how well the design fits into a domestic surroundings. A choice in details, such as the feet for the chair and footrest, gives people the opportunity to integrate the furniture into their existing interior.

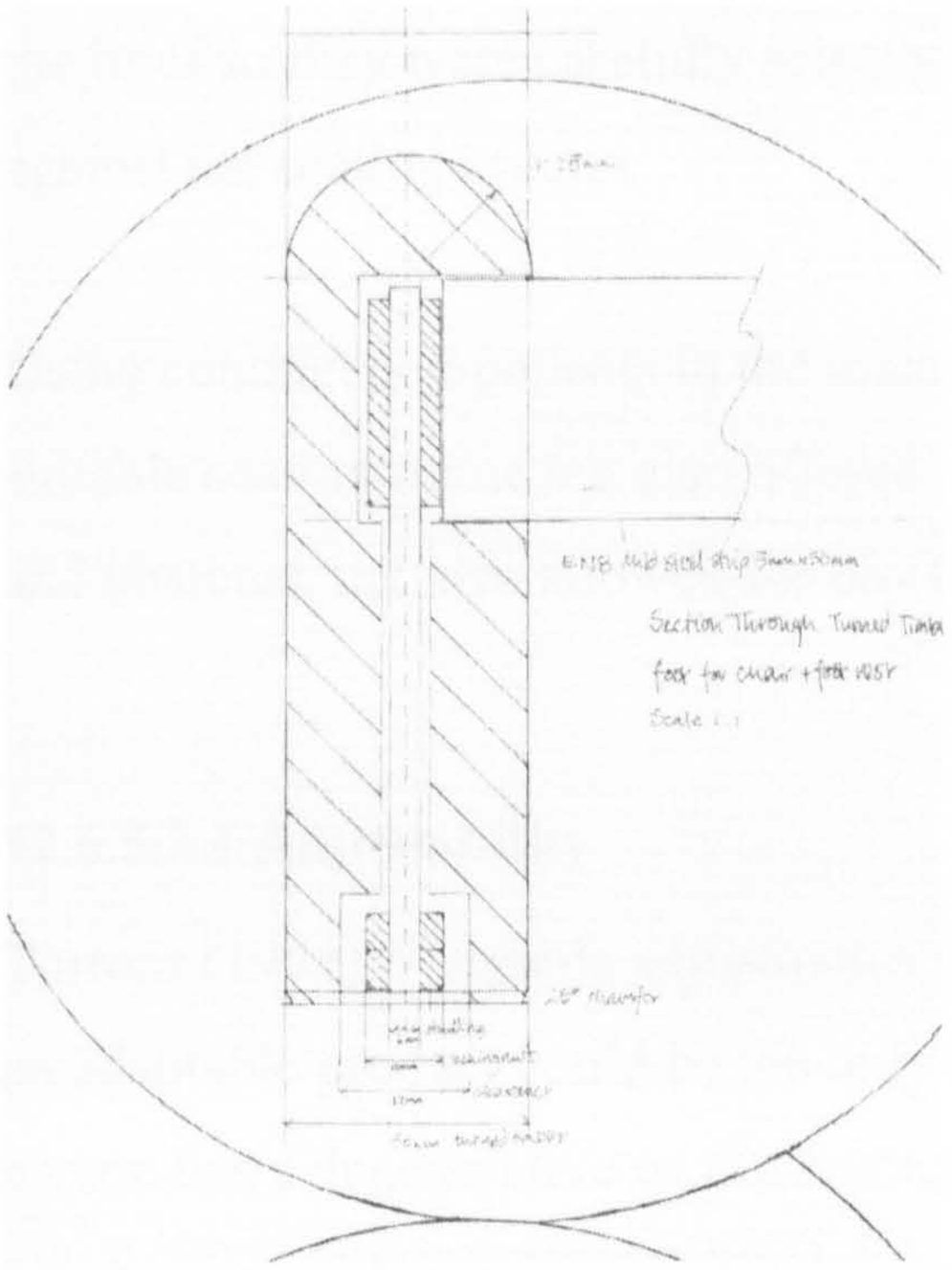

Figure 76. Extract of construction drawing: detail of foot

12.6.5.2 Designs for the footrest

The foot rest could be more accurately be described as a full length leg rest.

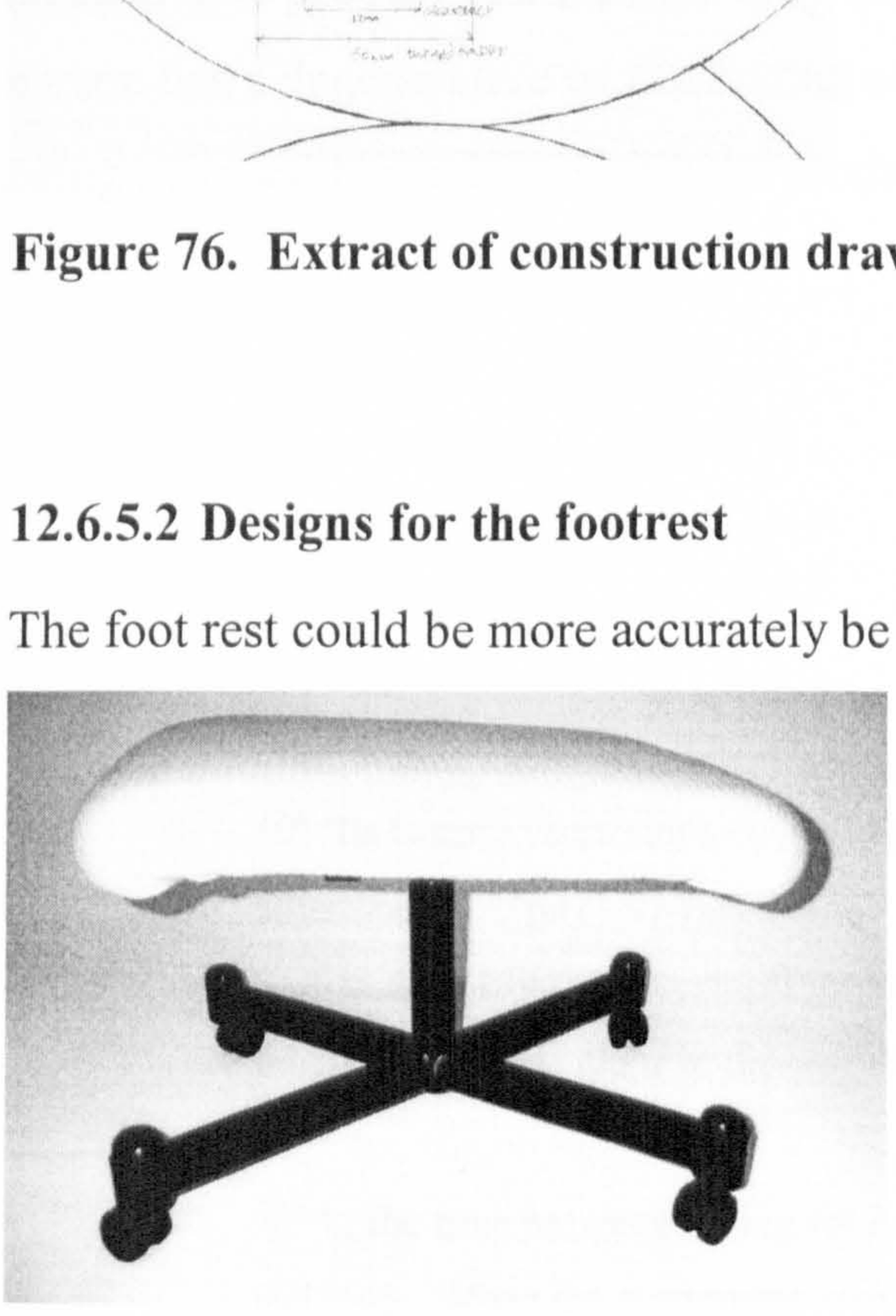

Figure 77. Prototype of footrest

12.6.5.3 Contract components

Contract components have been developed over the last two decades to perform complex functions such as 'slides, tilts and height adjustments...' (Sudjic, 1994)[326] In many cases the components performed too-great-a-movement than was required by the brief so they were carefully selected, by testing samples sent by several companies, against the seating criteria.

Using contract components in the manufacture of the prototypes not only produced a suitable seating frame but also offered a range of adjustments to fit a range of people and postures, but also allowed for day to day adjustments depending on disability.

12.6.5.3.1 Adjustability

Torrens (1994)[327] regards adjustments within certain disability products as essential: an adaptable product could be the only way to suit a user's situation, in cases where a person has a degenerative or fluctuating condition and there is a time delay between being assessed for and receiving the product.

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[326] 'Its twenty years since chairs began to incorporate slides, tilts and height adjustments....'p31
Sudjic, D. (1994) Blueprint (Promotion), (Playfulness) Have these men designed the most comfortable chair in the world?, October, 29-36

[327] '...the time between asking for help and receiving products specified by the OT was too long. When the equipment arrived the person's physical ability had often deteriorated so much that the product was no longer of use to them. Adaptability of the product, or at least the ability to control the equipment in a variety of ways was highlighted as essential to combat obsolescence due to the increasing deterioration of the person's condition.' p3
Torrens, G. (1994) Proceedings : A discussion of research and development methods through to a commercial conclusion, Conference of the European Academy of design, Designing for physical disability, December 17, 1994, University of Salford, p3

12.6.5.3.2 Modularity

A design which uses these pre-configured contract components can be described as being 'modular'. Inclusion of components, produced by OEM's and used in other assemblies, are already assured products and offer this advantage over an a new and untested unit. (Torrens, Marshall et al., 1996)[328]

A design which is modular in form can comprise of one of many components generally offering flexibility and choice to the end user. 'Standard components', that is that they are produced in large quantities and used by many producers, can be used wherever possible to keep costs to a minimum. Modularity allows for economically achievable diversity. (Ibid.)[329]

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[328] 'Many of the electrical components had already been specified through Original Equipment Manufacturers (OEM's) The existence and expansion of the OEM's has given the designer and product engineer an opportunity to access a wide range of 'off-the-shelf' components. OEM components offer a number of advantages: They are of known performance; they are of known reliability, the producer of the OEM product has specialist knowledge about the component or material; Only the required number of units needed be bought to produce the product Just-in-time may be applied easily...'
Torrens, G., Marshall, R. et al. (1996) Using Modularity to Produce more Competitive Assistive Technology Products presented at Irish Manufacturing Committee Annual Conference, University of Limerick, p800

[329] '...the concept is vital to the survival of small to medium enterprises in niche markets... Modularity has allowed a product to be designed to meet a wide range of customer requirements... Modularity has also allowed the product to be manufactured economically with standard components and unskilled labour. Modularity is seen as a key design tool to aid in addressing the diametric pressures of providing variety to meet market need and standardisation and rationalisation to meet company needs... designers and engineers should be cautious of the product specification being driven by the availability of standard parts...'p803
Torrens, G., Marshall, R. et al. (1996) Using Modularity to Produce more Competitive Assistive Technology Products presented at Irish Manufacturing Committee Annual Conference, University of Limerick, p803

12.6.6 Give people what they want

Having discovered that there is no consensus of taste, not one all-satisfying aesthetic, a means must be found to give people the design identity that they want, are familiar with and feel comfortable with. Particularly if its a disability product and there is benefit in its regular and continued use.

John Miller, (1997)[330] from Design Strength, is a designer who consults with product users in their home. This opportunity for 'feedback' keeps him in touch with his customer's choices and tastes, whether 'mahogany finishes and floral design'.

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[330] 'I am rather unusual for a designer, as I also manufacture some of my products and often take them into customers' homes for feedback. In their environment the contrast between my customers' and my own ideas of aesthetics can be acutely apparent, but I know that the mahogany finishes and floral design that they sometimes demand would be ridiculed by my design colleagues!'
John Miller from Design Strength *in* Coleman, R. (Ed) (1997) Working Together: A New Approach to Design, Royal College of Art: London, p31

12.6.7 Developing the prototype cabinet

The prototype shows how it is designed to accommodate the wrists and hands in a neutral position by having accentuated posts on each corner. These can be used to move the cabinet, on casters, into place.

Figure 78. Accentuated posts on each corner

12.6.7.1 Constructing the arms of the chair

Laminated timber was used as a base for upholstery. It was cut to shape for the arms and to work on the positioning of the wings.

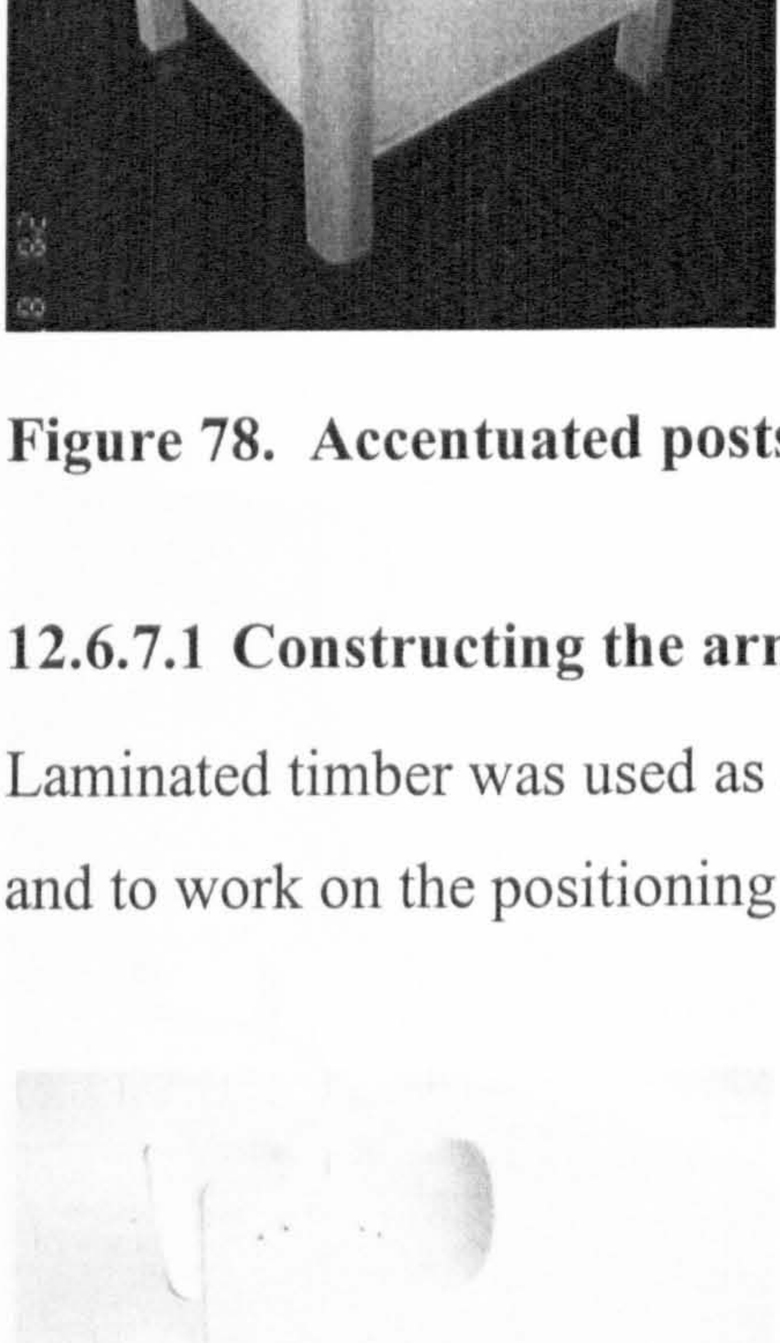

Figure 79. Laminated timber was cut to shape

Different densities of foam were cut and glued to the ply.

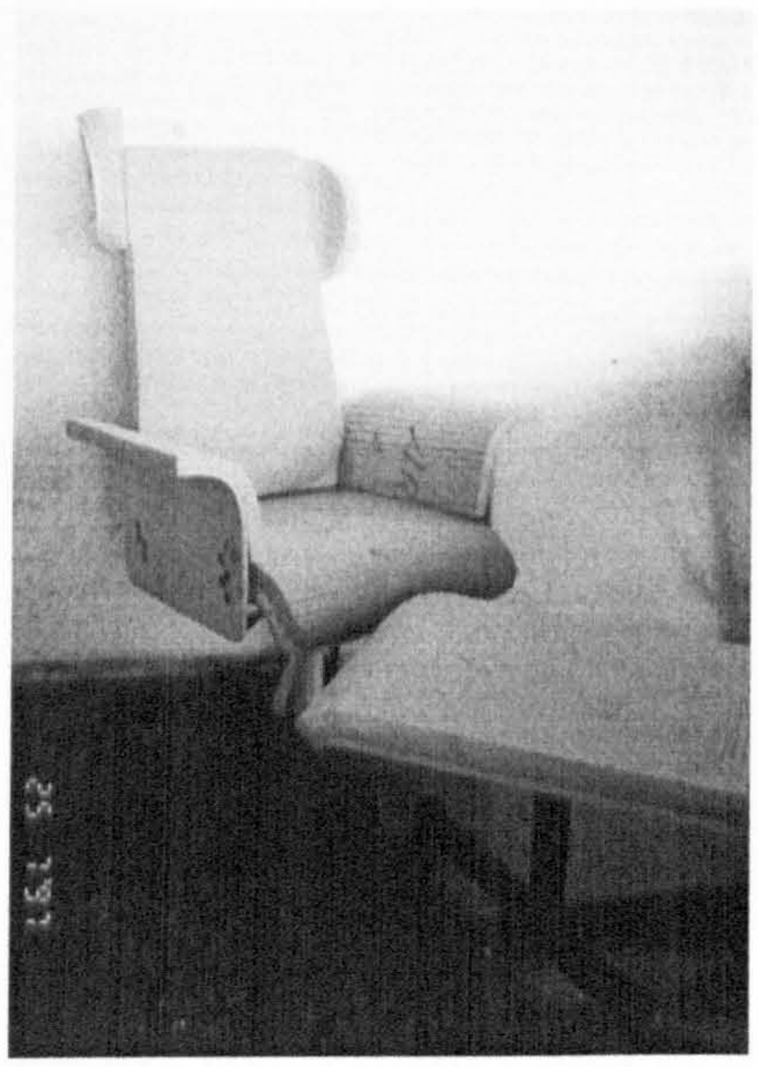

Figure 80. Foam glued to the ply.

The foam was then tightly covered will either calico or a schedule 3 fire retardant interliner, depending on the qualities of the final upholstered cover.

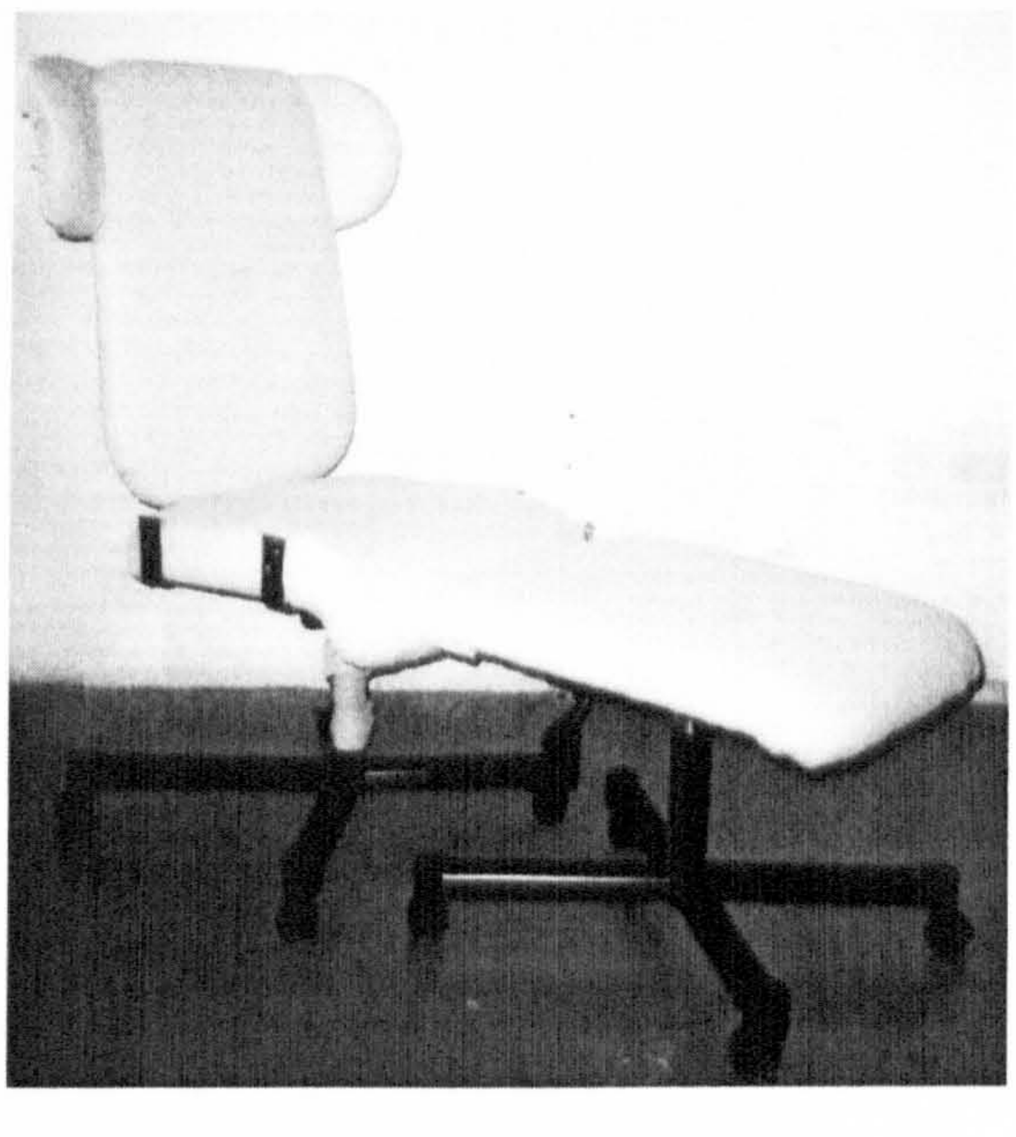

Figure 81. Schedule 3 interliner or calico tightly covers foam.

Once the interliner had been complete the cushions were worked on and the arm discs and their fixings.

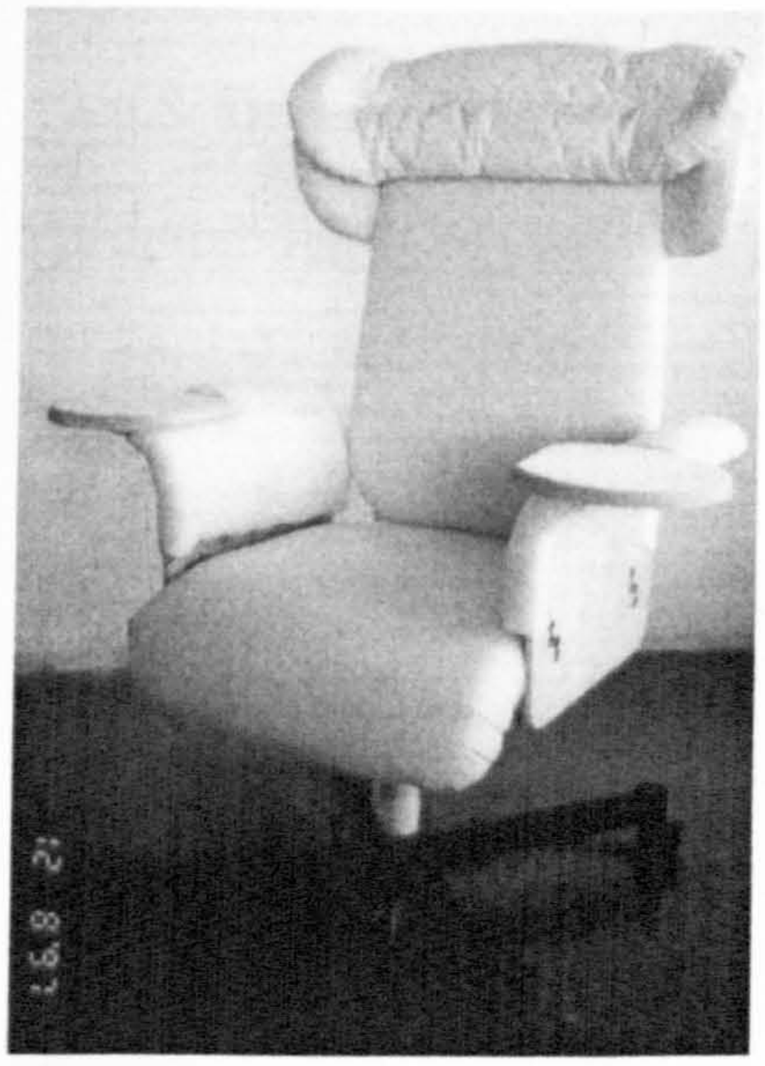

Figure 82. Fittings and cushions added

Arm discs were machined using an overhead router. Initially attached to a jig that the table mounted pin could follow and then freely to radius the circumference.

An inset of acrylic fitted into a rebate to protect the veneer from hot cups.

12.6.8 Details of prototype cabinets

A routered groove under the pull out surface helps the fingers locate to drawer forward the pull out surface. The runners stop at furthest their extent.

Figure 83. Pull-out surface

The resins handles are designed for a non-standard grip, where a grip cannot be made because not all the fingers flex. They are designed to be used from the top or side with a hand or finger. The form was developed from a drawing, clay mock-up timber positive and then cast in styrene.

Figure 84. Resin handles

The two completed prototype cabinets finished to match the chair and footrest.

12.6.9 Upholstering the chairs

Several generations of paper patterns were made, the first one was developed using a Charles & Rae Eames chair to estimate the amount of fabric to buy.

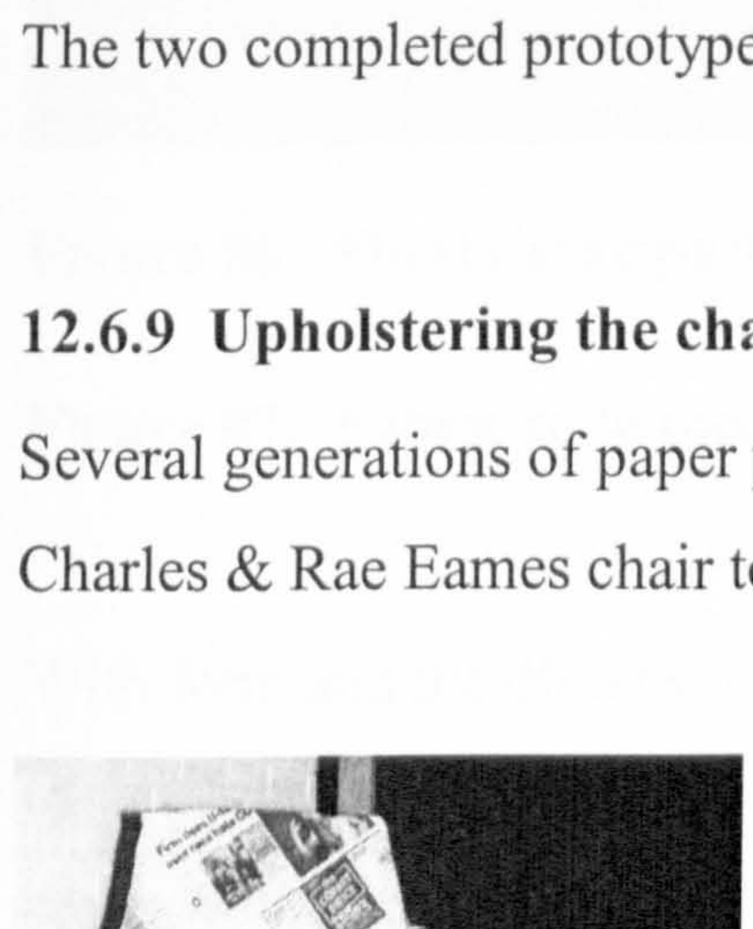

Figure 85. First paper pattern

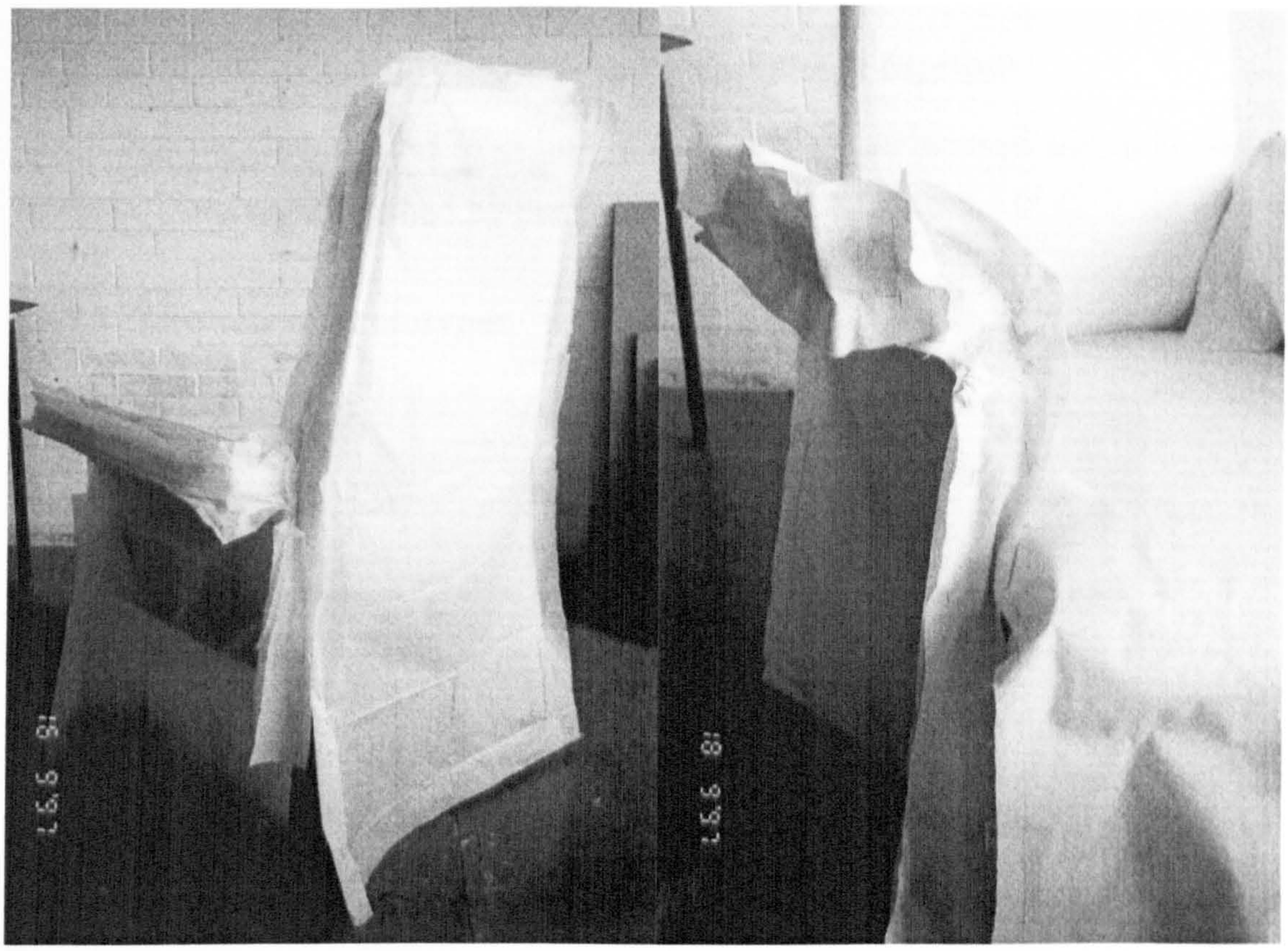

Figure 86. Final tissue pattern pinned to prototype chair.

Figure 87. Fabric toile pieces pinned onto prototype chair.

With form and the dimensions of the chair finalised, a final tissue pattern was pinned to fit. A calico toile was then tailored from the tissue pattern to check how a fabric cover worked on the chair. The toile was reversed to see how flat the seams lay. The real fabric can be cut confidently avoiding expensive errors.

12.6.9.1 Knitted upholstery fabric

A collaboration with Jessica Payne, a fellow PhD student at the Royal College of Art, working on constructed textiles, knitted a length of prototype upholstery fabric. It is a blister fabric, knitted in wool to encapsulate Nylon wadding in a regular cheque design. It was intended to be dark green, but it was discovered that the available dye was incompatible with the wadding used to fill the blister fabric, so it remained cream.

12.7 Commentary on prototypes - photographs & captions

The following chapter illustrates how the prototypes can be used and their certain features, these are described by the caption titles.

12.7.1 Two sets of prototypes

Figure 88. Red & cream prototypes: chairs with and without wings, footrests, cabinets, cushions & day blankets.

12.7.2 Demonstrating use of cream prototype

Figure 89. Cream prototype: sitting down using arm discs for support, chair with wings, footrest, day blanket & cabinet.

Figure 90. Cream prototype: sitting on chair with wings, footrest & cabinet.

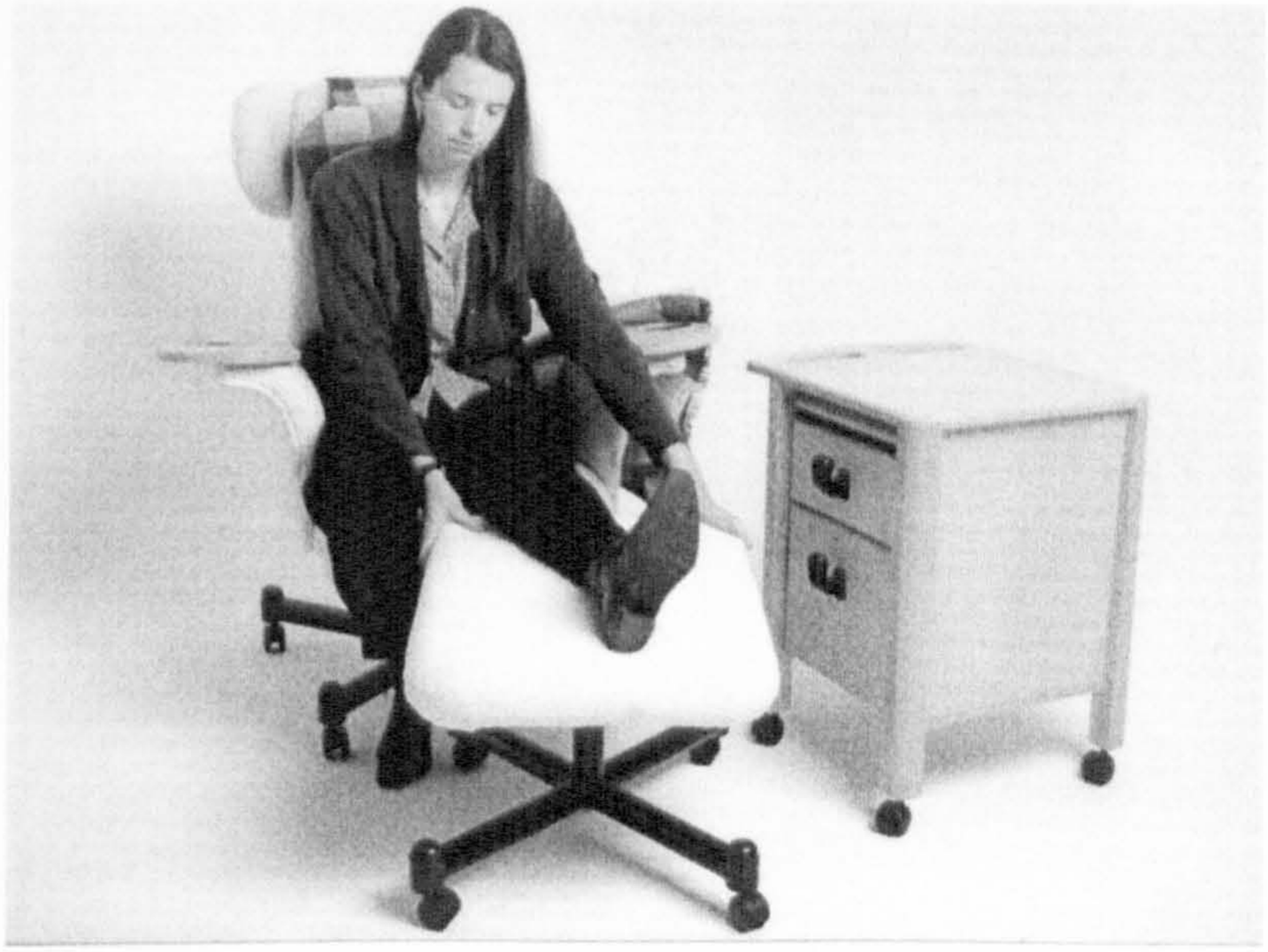

Figure 91. Cream prototype: moving footrest into place, chair with wings, day blanket & cabinet.

Figure 92. Cream prototype: using footrest, chair with wings & cabinet.

Figure 93. Cream prototype: using footrest & day blanket, place for cup, chair with wings & cabinet.

12.7.3 Demonstrating use of red prototype

Figure 94. Red prototype: sitting down using arm discs for support, chair with wings, footrest, day blanket & cabinet.

Figure 95. Red prototype: sitting on chair with wings, footrest & cabinet.

Figure 96. Red prototype: moving footrest into place, chair with wings, day blanket & cabinet.

Figure 97. Red prototype: using footrest, chair with wings & cabinet.

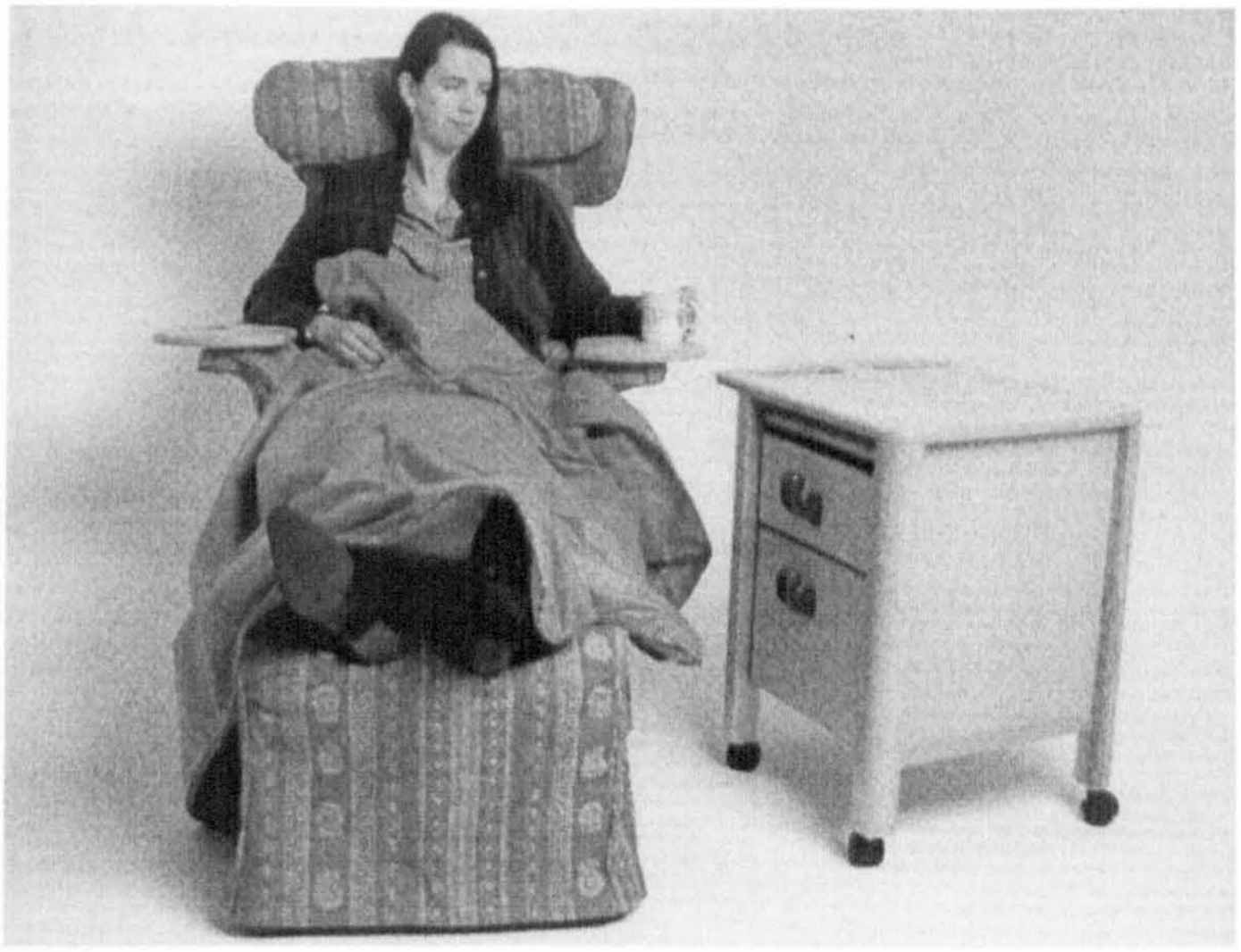

Figure 98. Red prototype: using footrest & day blanket, place for cup, chair with wings & cabinet.

12.7.4 Arm detail

Figure 99. Red prototype: arm detail from chair/'jammy dodger', place for cup.

12.7.5 Detail of cabinet's stick holder

Figure 100. Cream prototype: using crutch/stick holder on cabinet, chair with wings & footrest.

Figure 101. Placing crutch in stick holder on cabinet, chair with wings & footrest.

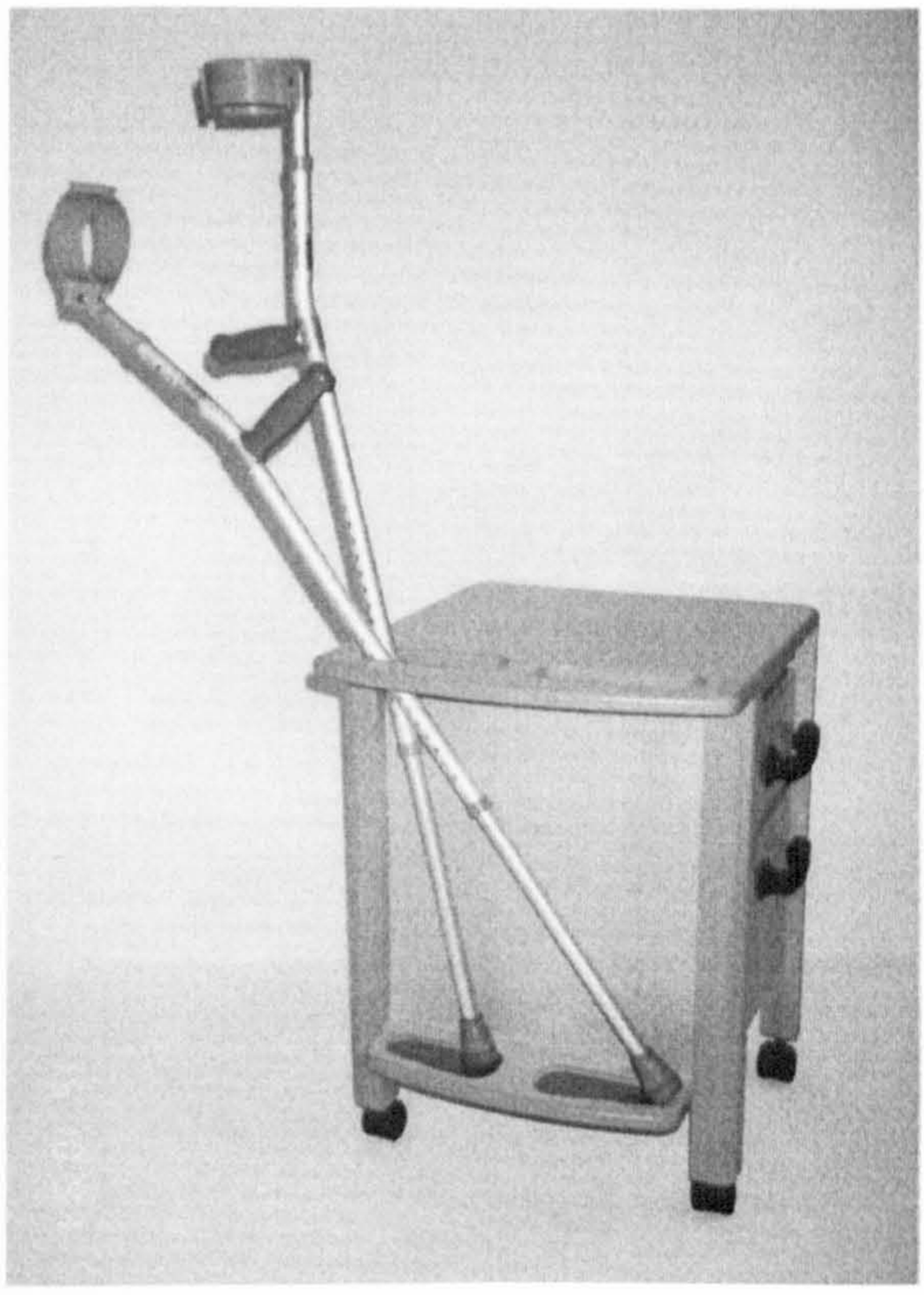

Figure 102. Crutches in stick holder on cabinet

12.7.6 Detail of cabinet's surface & drawers

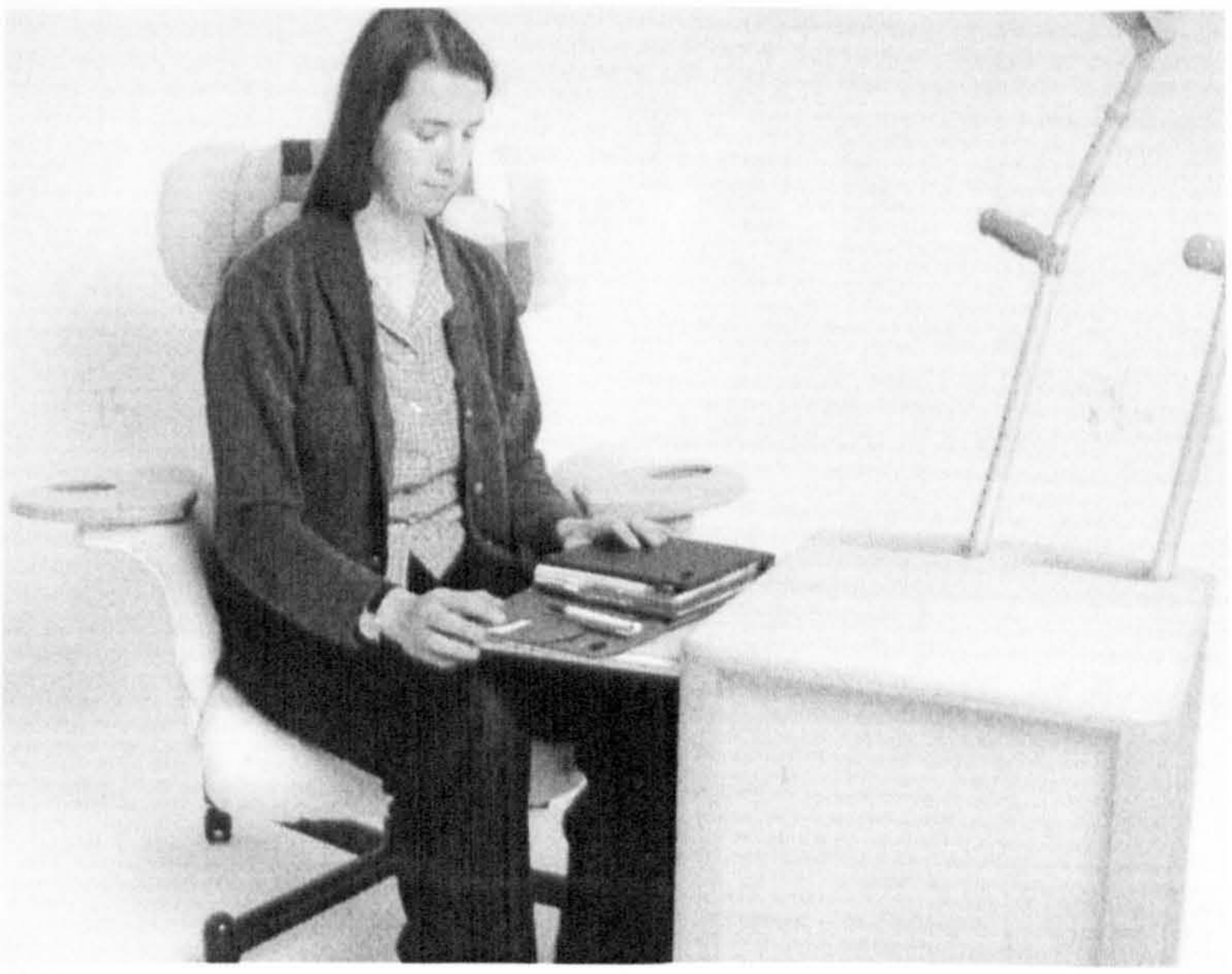

Figure 103. Cream prototype: using pull out surface on cabinet, crutches in place, chair with wings.

Figure 104. Cream prototype: using top drawer of cabinet, crutches in place, chair with wings.

Figure 105. Cream prototype: using bottom drawer of cabinet, crutches in place, chair with wings.

Figure 106. Cabinet's top surface: stick holder used as handle

The Design of Disability Products with Special Reference to the User.

Case Study: Domestic Seating for Young Adults with Arthritis.

Lucy E. C. Poole, B.A. (Hons.), M.A.

Submitted August 2001

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A thesis submitted in partial fulfilment of the requirements of the University of Wolverhampton, School of Art and Design for the degree of Doctor of Philosophy.

Funded by: HFCE 1994-6, ARC 1996-7,
Lucy Poole & Alastair McDonald 1997-2001

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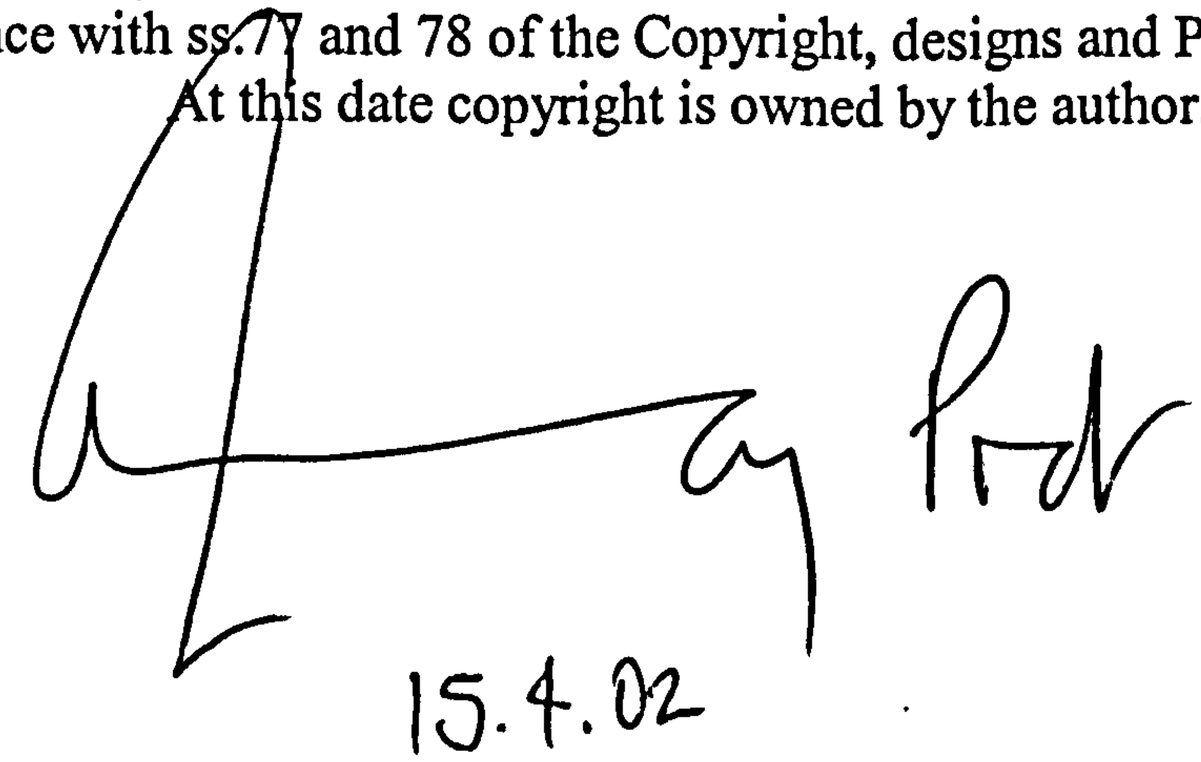

15.4.02

13 SECTION THREE - Testing the prototype with produce users

13.1 Introduction to SECTION THREE

This section includes explanations of testing methodology, protocol and results, it documents which participant tried which prototype. In the main, there are three sets of results which take the form of footnoted transcript highlights grouped in salient topics. The first two are interviews with testing participants and the third interview is with an ergonomist Professor Mark Porter. The prototype designs where evaluated using this feedback.

13.2 Introduction to testing prototypes

Following the work of Galer and Harris (1981)[331], the prototypes were tested in two ways in 'laboratory tests' and 'field trials'.

The 'laboratory tests', or more accurately, workshop tests, involved each piece being scrutinised to make sure that it was strong and stable enough for expected, reasonable use. Relevant British Standards were consulted[332]. Then pilot tested to check the

---

[331] Ergonomic Product Test

'Ergonomic Product tests usually take two forms:

1. laboratory tests in which products are tested under controlled conditions.
2. field trials in which the use of products is demonstrated by users in the environments in which they are normally used.

Ergonomics can contribute not only to product evaluation but also the design specification frequently based on the results of product evaluations...'

Galer, M. & Harris, C. (1981) Ergonomics and Rehabilitation Aids, Seminar at the Institute of Consumer Ergonomics, 2nd Dec., p7

[332] British Standards Institute:

BS 3044: 1990 - Guide to ergonomic principles in the design and selection of office furniture

BS 4875: Part 1: 1985 - Strength and stability of furniture, Part 1 Methods for determination of strength of chairs and stools.

BS 4875: Part 2: 1985 - Strength and stability of furniture, Part 2 Methods for determination of stability of chairs and stools.

anthropometric details were correct, i.e. the right size and height. The 'field trials' were specifically home trials.

13.2.1 Testing methodology

As with the surveys, the testing procedure was pilot tested before being carried out.

In the field of design and disability there many nuances to consider, depending on personal experience and perspective. Aware of the strong criticisms of some

---

BS 5459: Part 1: 1977 Specification for performance requirements and test for office furniture, Part 1. Desks and tables.
BS 5459: Part 2: 1990 Specification for performance requirements and tests for office furniture, Part 2. Office seating.
BS 5459: Part 3: 1983 - Specification for performance and test for office furniture, Part 3 Storage furniture.
BS 5852: Part 1: 1979 Fire tests for furniture, Part 1 Methods of test for the ignitability by smokers materials of upholstered composites for seating.
BS 5852: Part 2: 1982 Fire tests for furniture, Part 2 Methods of test for the ignitability of upholstered composites for seating by flaming sources.
BS 5940: Part 1: 1980 Office Furniture, Part 1 Specification for design and dimensions of office workstations, desks, tables and chairs.
BS 6250: Part 1: 1982 - Domestic and contract furniture, Part 1 Specification for performance requirements for seating.
BS 6250: Part 3: 1991 - Domestic and contract furniture, Part 3 Specification for performance requirements for cabinet furniture.
BS 6261: 1982 Evaluating the appreciation of and interaction between components in upholstered furniture.
BS 7179: Part 5: 1990 Ergonomics of design and use of visual display terminals (VDTs) in offices, Part 5. Specification for VDT workstations (3.6 chair mentions 5 star bases)
BS EN1101: 1996 Textiles and textile products - Burning behaviour - Curtains and drapes - Detailed procedure to determine the ignibility of vertically oriented specimens (small flame)
BS EN 1102: 1996 Textiles and textile products - Burning behaviour - Curtains and drapes - Detailed procedure to determine flame spread of vertically oriented specimens
BS 5866: Part 4: 1991 Blankets suitable for use in the public sector, Part 4. Specification for flammability performance.

researchers being 'parasites', 'feeding' off their disabled subjects (Oliver, 1997 (a.))[333] & (Oliver, 1997 (b.))[334] and objectifying them, thought was given to my approach to working with product users.

It was also vetted by the ethics committee and advised by Dr Jon Bernardes to confirm the appropriate nature of the testing process. (Ward, Rogers et al., 1996)[335]

Participants were given an introduction to each of the prototypes and given time to become familiar with them before any testing took place. Le Carpentier's, (1969)[336] work sets an example to allow time to familiarise the participants to the test details.

Ten participants used the furniture in their own homes for a two week period. They recorded their thoughts in a diary and they were interviewed twice: once before and

---

[333] Oliver, M. (1997) Final Accounts and the Parasite People, Doing Disability Research Conference, at Leeds University, 3-4 Sept. 1997

[334] '...we as researchers gain, but mainly at the expense of those whose lives we have researched. While our intentions have been honourable, we remain on the wrong side of the oppressive social and material relations of research production.' p26
Oliver, M. (1997) Doing Disability Research, Emancipatory Research: An realistic goal impossible dream? Leeds: The Disability Press, p15-31

[335] '...The designers of assessment studies and those who seek to develop such methods must ensure that the approaches adopted allow the extraction of the maximum amount of reliable, significant data with the minimum additional inconvenience to subjects.'
Ward, J., Rogers, N. et al. (1996) Journal of Rehabilitation Sciences, Techniques for the measurement of the human body and its actions: applicable to design for physically disabled people, issue 9, no.2. p42

[336] 'Each of the 8 subjects was asked to sit in the chair for a practice period of one hour to get used to the operating of the chair and to become familiar with the signals of the experimenter... used to indicate which adjustments were to be made'.
Le Carpentier, E.T. (1969) Ergonomics, Easy Chair Dimensions for Comfort - A Subjective Approach, Vol.12, p330

once after their trial period. They rated their views, as well as their 'gut-reactions', on the seating's functional and aesthetic qualities.

These interviews were recorded and transcripts were made and analysed. Each participant was thanked, by way of a token, for their involvement.

13.2.1.1 Testing data protocol

Participants are referred to by false initials to preserve their anonymity.

13.2.1.2 Summary of prototype testing process

1. **First Telephone contact -** establish interest/willingness to participate, arrange first visit.
1. **First visit -** find house & see parking arrangements, establish space enough for prototype, gain written consent, visual record and survey of existing seating arrangements, leave information on the prototypes (also information leaflet on sitting & seating provided by ARC), arrange delivery date.
1. **Second visit -** deliver prototype, adjust it to fit individual, visual record of installation.
1. **Testing Period -** participants record comments onto tape recorder, maintain diary.
1. **Collect Prototype -** visual record of the prototype 'established' and in-situ, conduct post testing interview, ask participant to maintain diary to note and contrasts/ comparisons with original/existing seating
1. **Diary returned -** after a further 2 weeks the participant returns diary using stamped address envelope.

13.3 Testing results

13.3.1 Introduction to testing results

13.3.1.1 Initial interview results

Before the seating trials began participants were interviewed, using structured questions, to gain an understanding of their existing seating arrangements. Each interview was recorded on audio tape and from these transcripts were made. The transcripts are as accurate a record as could be made with the equipment available. If there were any occurrences, i.e. interruptions, poor sound quality or if there was laughter it is noted in the script, in italics and square brackets *[]*. A '#' precedes the interviewees' words, those without are my own.

In the **List of accompanying material:**

- The tapes of the interviews and the subsequent transcripts will be available during the viva

In the **Appendices:**

- **Sample Transcript: CJ's initial interview: understanding seating arrangements**

- **Tables of responses to initial interview: understanding existing seating** - collated results

- **Transcript highlights of initial interview: understanding existing seating** - The rich conversational nature of the replies was maintained by highlighting extracts of the transcripts and grouping these by topic. Common threads of comments emerged. These extract headings are listed as a table of contents at the beginning of the chapter and individual comments follow.

In the main text later in this chapter

- **Footnoted highlights of initial interviews: understanding existing seating -** are as the title suggests a version of the highlights that have been presented as footnotes in order to make it easier to summarise.

13.3.1.2 Results from prototype testing diaries

During and immediately after testing the prototypes participants recorded their thoughts, noted contrasts and comparisons with original/ existing seating in a diary. They were able to use diagrams of the prototype and a new page for every day.

In the **List of accompanying material:**

- the diaries, written & taped and their subsequent transcripts will be available during the viva.

In the **Appendices:**

- **Diary for recording thoughts while testing prototypes -** a blank copy.

- **Transcript highlights from diaries kept during, & interviews after, testing the prototypes -** Selected highlights from the diaries were combined with those from the post-testing interviews. Complimenting or in some cases reiterating thoughts in the final interview.

In the main text later in this chapter:

- **Footnoted highlights from diaries kept during, & interviews after, testing the prototypes -** are as the title suggests a version of the highlights that have been presented as footnotes in order to make it easier to summarise.

13.3.1.3 Results from post-testing interview

On collection of the prototypes participants were interviewed using structured questions, to record & rate their views on the seating's functional and aesthetic

qualities. Each interview was recorded on audio tape and from these transcripts were made.

In the **List of accompanying material:**

- The tapes of the interviews and subsequent transcripts will be available during the viva.

In the **Appendices:**

- **Tables of responses to post-testing interview: views on prototype furniture -** collated results

- **Transcript highlights from diaries kept during, & interviews after, testing the prototypes -** The rich conversational nature of the replies was maintained by highlighting extracts of the transcripts and grouping these by topic. Common threads of comments emerged. These extract headings are listed as a table of contents at the beginning of the chapter and individual comments follow.

In the main text later in this chapter

- **Footnoted highlights from diaries kept during, & interviews after, testing the prototypes -** are as the title suggests a version of the highlights that have been presented as footnotes in order to make it easier to summarise.

  Following each quote is its source, e.g. WM p2 is from WM's interview transcript page 2, and DM dp5 is from DM's diary, page 5. One of the participants was not available for the final interview so a postal questionnaire was used, it was referred to as DK questionnaire.

13.3.1.4 Participants were photographed using prototypes

The participants were photographed in their existing seating and using the prototype furniture. Where permission was granted these have been included in the previous section, **Participants testing prototypes**.

13.3.2 Participants using the prototypes

13.3.2.1 Which prototypes each participant used

initials	*chair*	*footrest*	*cabinet*	*cushions*	*day blanket*
HJ	cream	y	y	y	y
WM	red	y	y	y	y
CR	red	y	y	y	y
RM*	cream	-	-	y	y
DK	cream	y	y	y	y
DM	cream	y	y	y	y
MY*	red	y	-	y	y
WD*	red	y	-	y	-
CJ	red	y	y	y	y
PM*	cream	y	y	y	y

*indicates those participant whom cut short their testing period because the chair did not suit them.

Some participants could not accommodate, or chose not to use all of the prototypes, a '-' indicates where a particular prototype was not tested.

13.3.2.2 Photographs of participants testing prototypes

The photographs taken of the participants using the prototypes were not formally analysed, they are for information only. Most participants are shown in their usual seating situation and with the prototype, comparisons can be observed between the difference in posture and positioning.

The temptation to compare the participant's usual seated posture with that on the prototype seat was resisted. Rather than speculate on the way that postures appear to have been affected, it was more relevant to pay attention to the comments of the user who knows how they are effected.

(In order to include as complete a picture as possible some of the photographs have been joined which may slightly distort the image.)

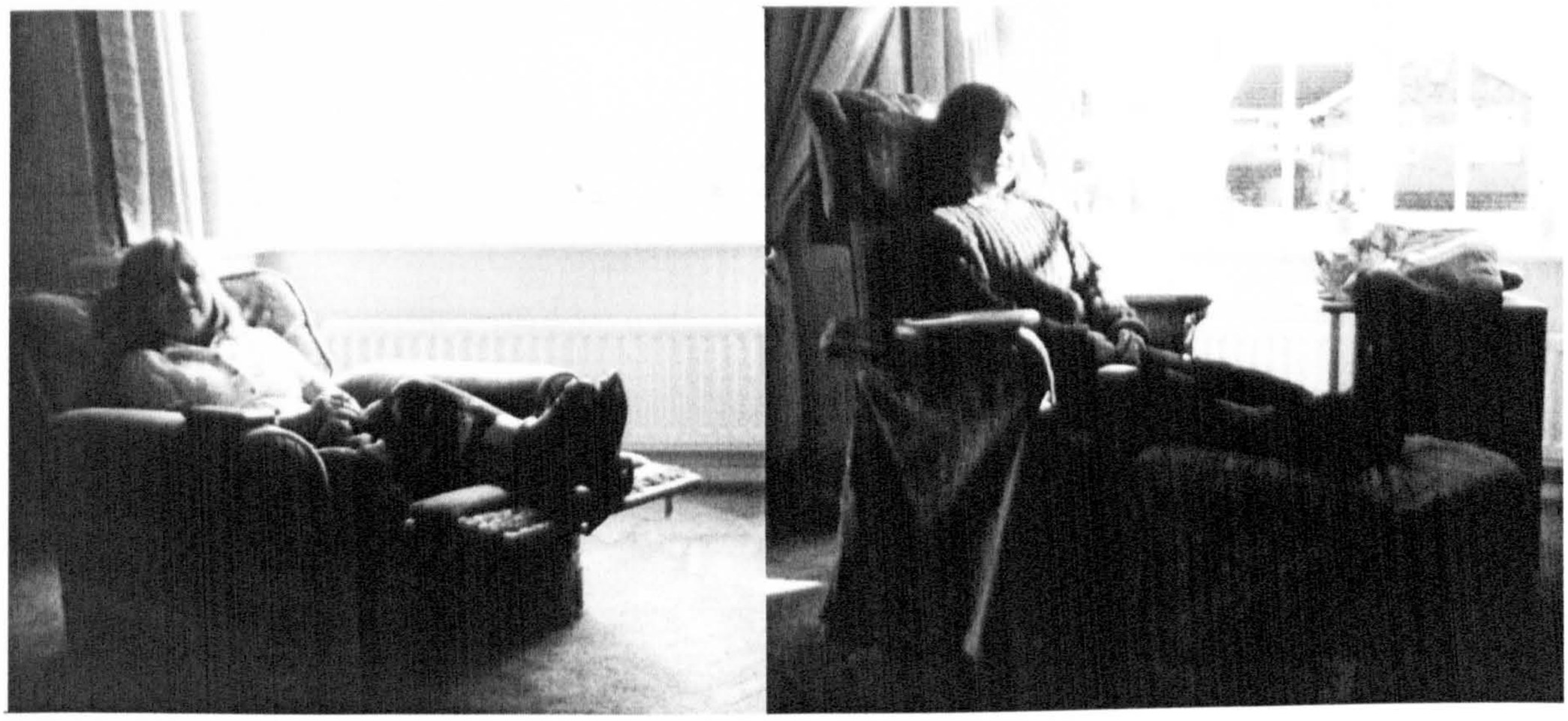

Figure 107. WM on usual seat (left) and testing red prototype (right).

Permission given to reproduce these images.

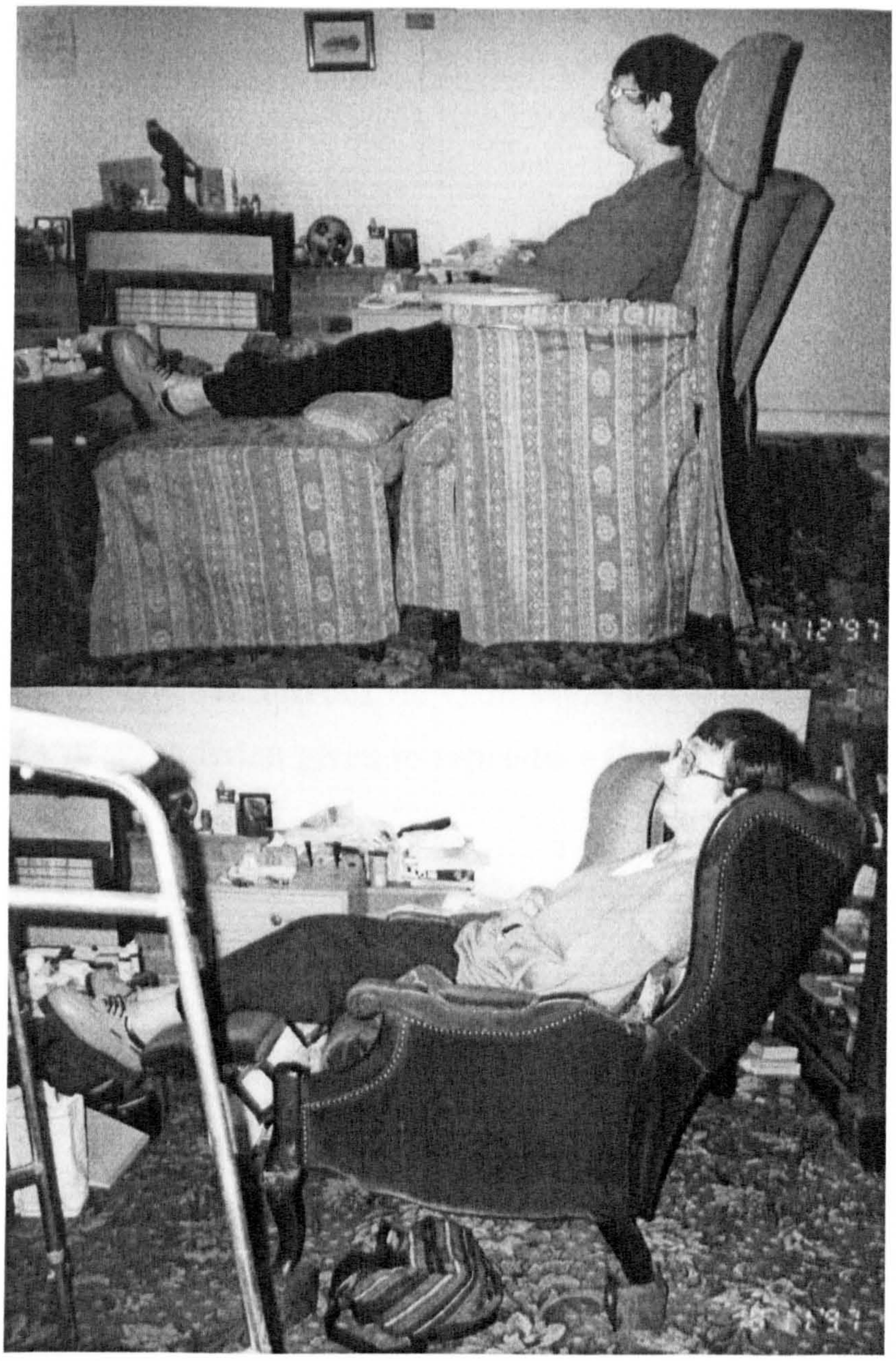

Figure 108. WD (side view) testing red prototype (above) and on usual seat (below). Permission given to reproduce these images.

Figure 109. WD (front view) on usual seat (right) and testing red prototype (left). Permission given to reproduce these images.

Figure 110. CJ on usual seat (left) and testing red prototype (right). Permission given to reproduce these images.

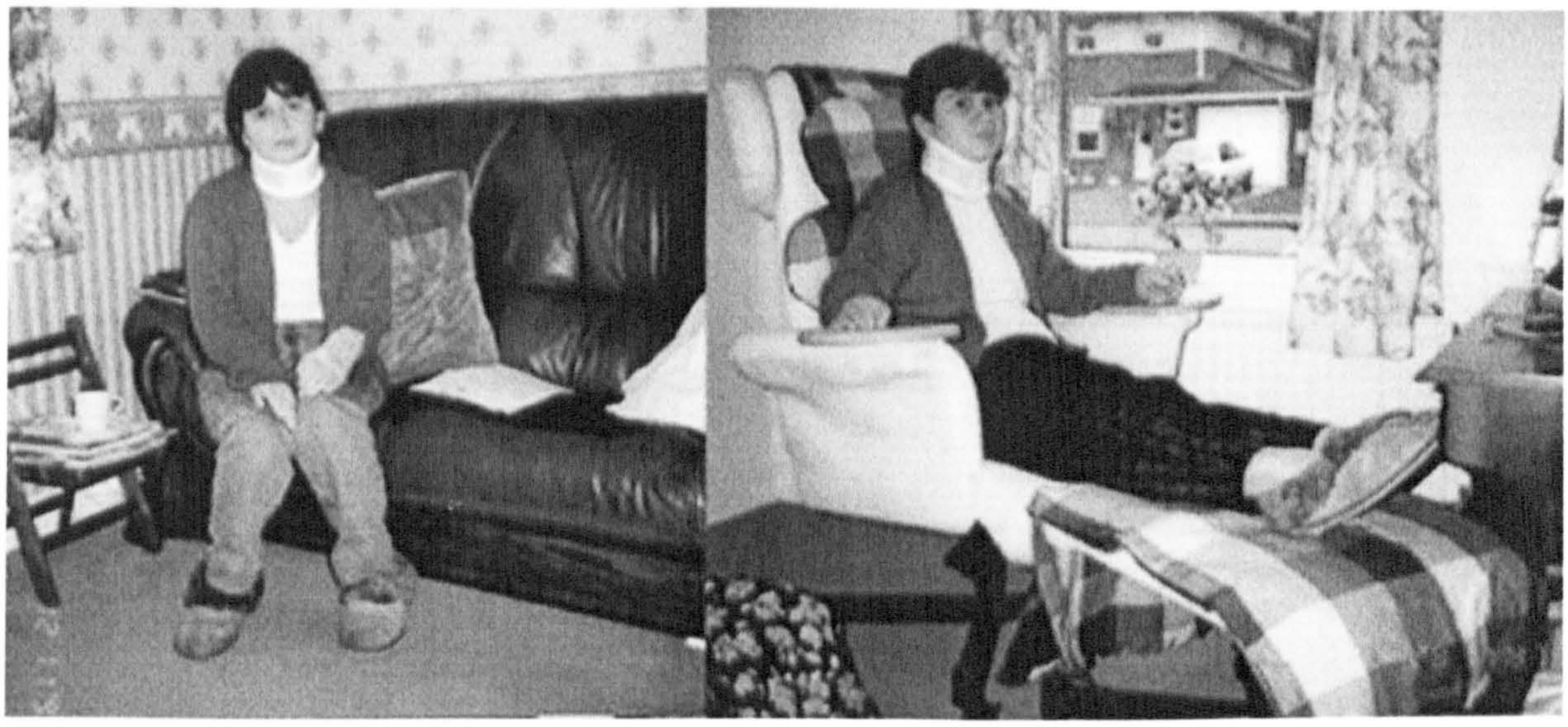

Figure 111. DM on usual seat (left) testing cream prototype (right). Permission given to reproduce these images.

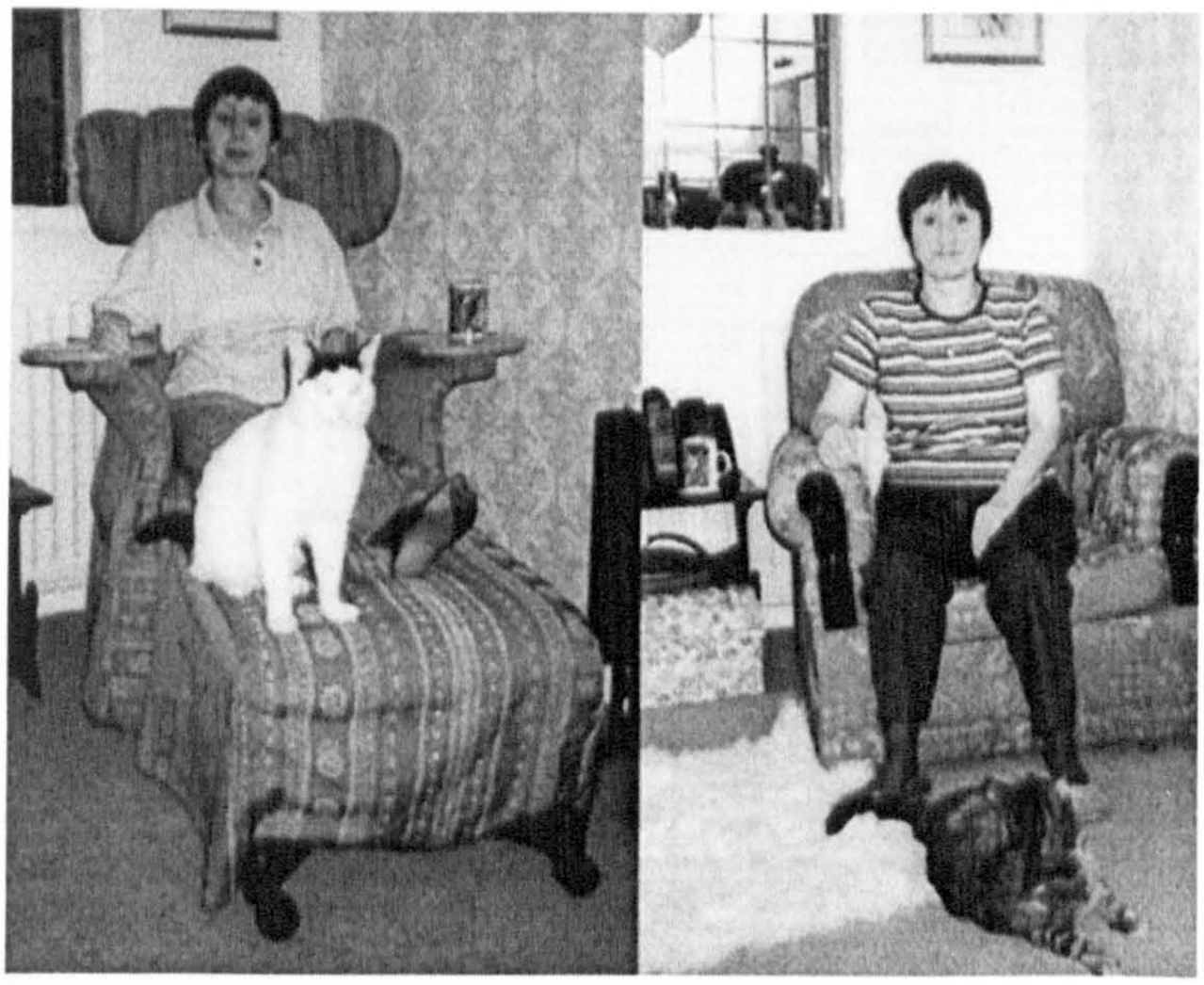

Figure 112. MY testing red prototype (left) on usual seat (right). Permission given to reproduce these images.

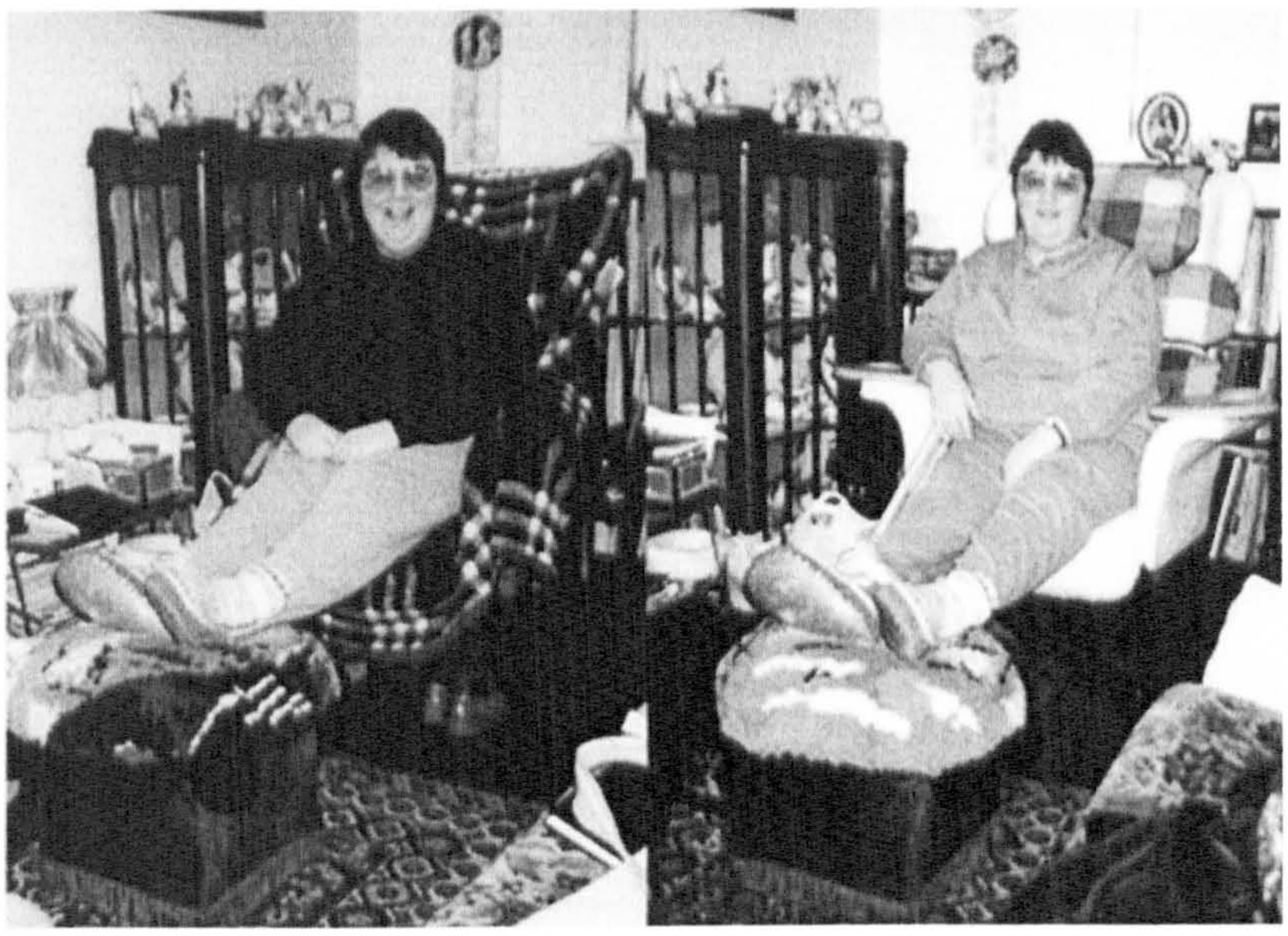

Figure 113. RM on usual seat (left) and testing cream prototype (right). Permission given to reproduce these images.

Figure 114. CR testing red prototype. Permission given to reproduce this image.

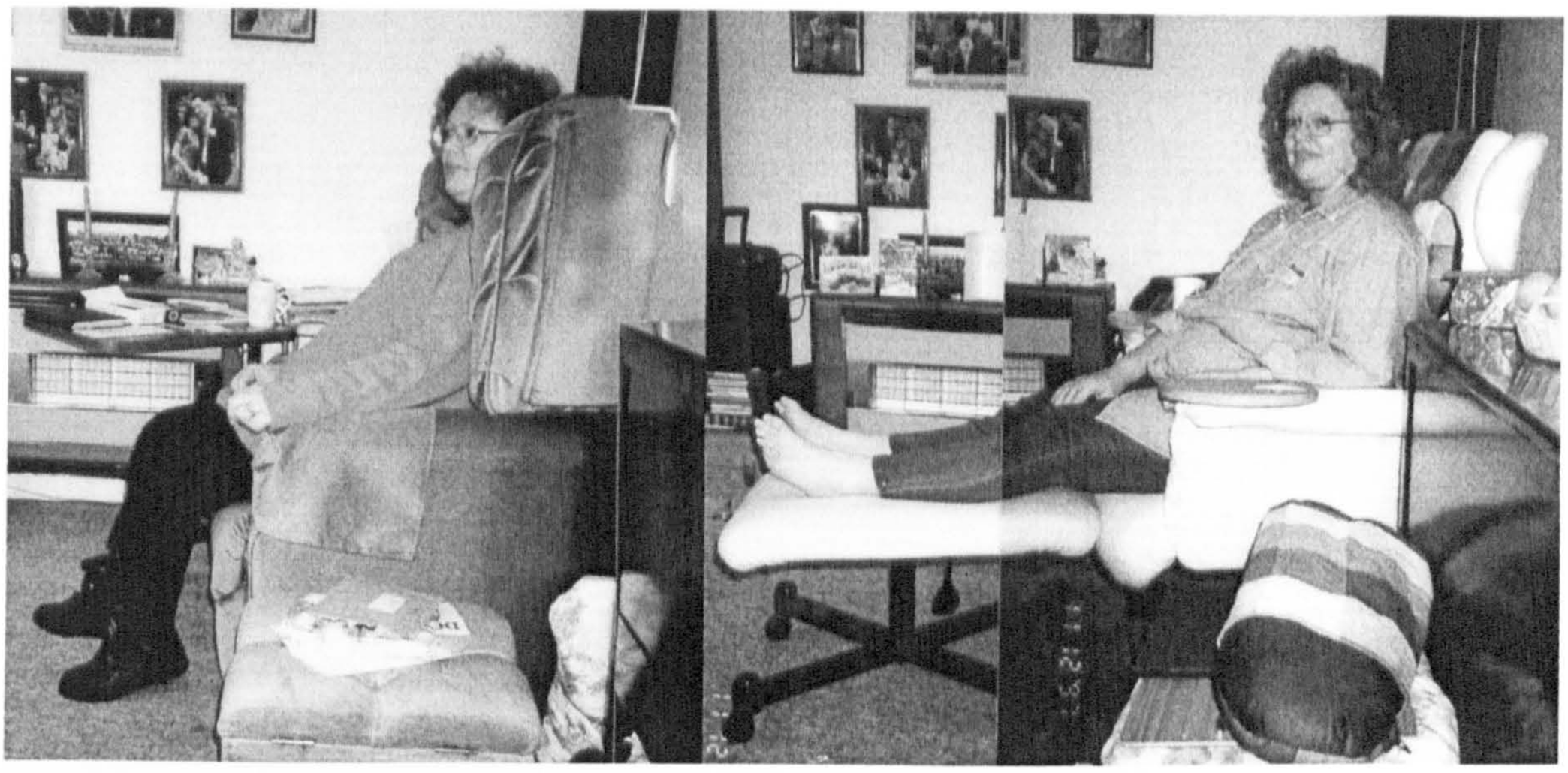

Figure 115. PM (side view) on usual seat (left) and testing cream prototype (right). Permission given to reproduce these images.

Figure 116. PM (front view) on usual seat (left) and testing cream prototype (right). Permission given to reproduce these images.

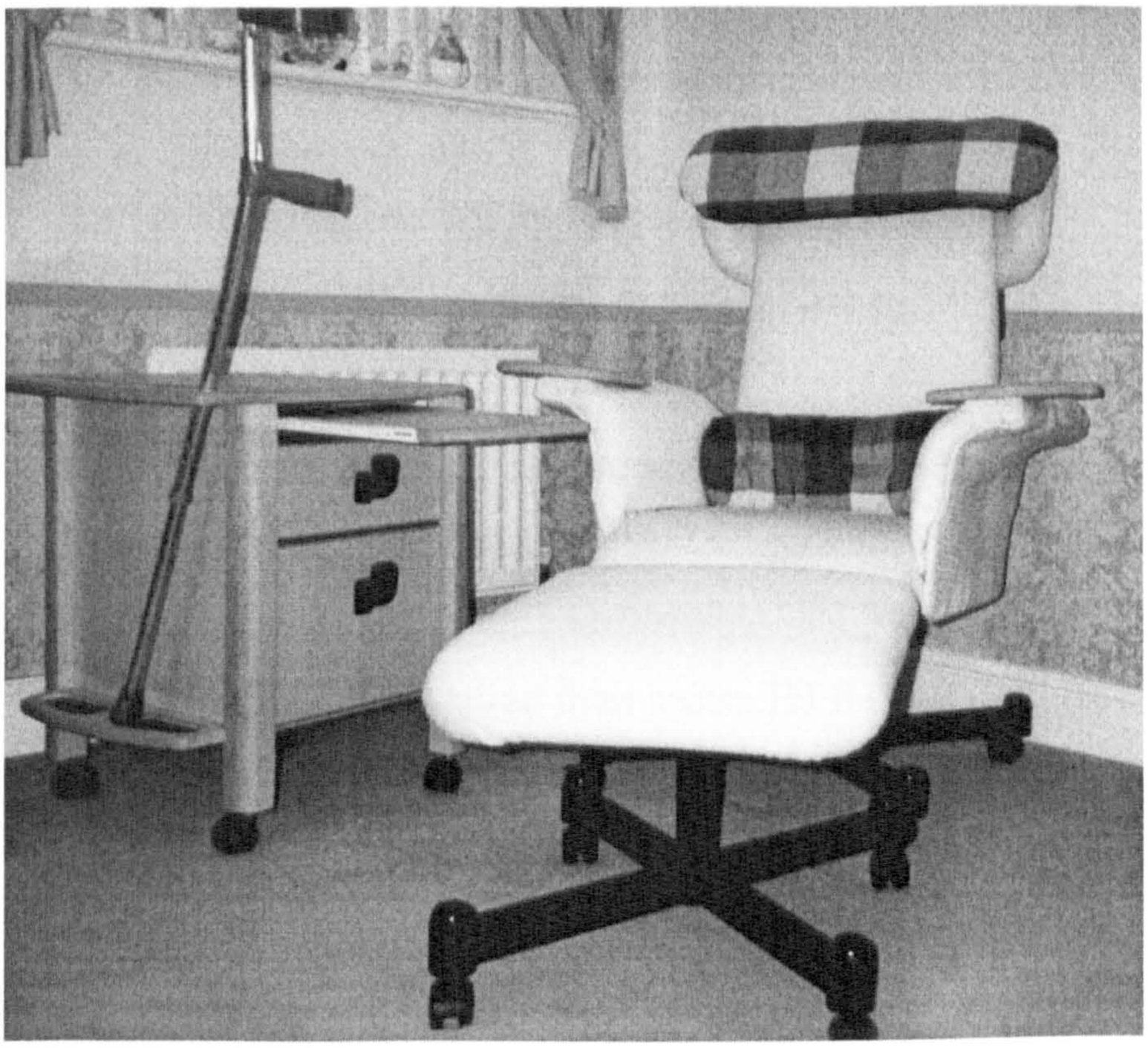

Figure 117. Cream prototype as HJ used it.

Figure 118. HJ on usual seats. Permission given to reproduce these images.

13.3.3 Footnoted highlights of initial interviews: understanding existing seating

13.3.3.1.1 Existing seating and seating habits

- Participant's usual seating arrangements: HJ IIp1[337], DM II p1[338]

- Participants used more than one seat and/or posture: WM IIp1[339], HJ II p1[340], PM II p2[341], DM II p1[342], DK II p9[343]

- How participant's acquired their seats: HJ II p2[344], RM IIp1[345], PM II p1[346], MY II p1[347], DK II p3[348], WD II p1 & p2[349]

---

[337] 'On the settee, and usually my feet up, on the poufee and cushions at my back. I've also got an extra cushion underneath the seat cushion as well, which just gives a bit more support.' HJ IIp1

[338] '...I always sit on the sides *[of the settee]* so that I can push myself up.' DM II p1

[339] 'I use both, in the day I use my recliner, night time, I seem to use the settee.' WM IIp1

[340] '...I've got a separate room, downstairs, where I've got a bed, with lots and lots of cushions...So I can go and lie and sit in there. So that I can actually have a sleep, or lie flat out, if I want to. There's also a high back chair, where I can sit more upright, rather than this which is more, sort of laid back. So I've really got three areas, where I can go.' HJ II p1

[341] '... I used to have a third one which was a *[perching]* stool in the kitchen, but I sent back because it was useless. *[laughs]* It did me more harm than good.' PM II p2

'...I have a (kneeling) back stool that I use at the dining room table. ' PM II p2

[342] 'Half the day I lie flat and half the day I sit down.' DM II p1

[343] '...So all the time I'm sitting down, I'm moving myself around really, distributing the pain between the three locations. After a while, I get fed up with all of this and go and lie down...' DK II p9

- A higher chair and recliner were considered indispensable: WM IIp3[350], RM IIp3 & p4[351]

---

[344] '...the chair is a very old chair. I was A's fathers and he's always loved it used to be A's office...I said well I'll have it down here, but, it didn't match, so it had to have a cover. Its padded, its got a quilt as well.' HJ II p2

[345] 'We bought it second hand. It was just with trying it. But it was a specially made orthopaedic chair, it had a sticker on the back. A company near Manchester.' RM IIp1

[346] 'I bought it *[raiser/recliner chair]* for myself. I tried out lots first of all but its from a local specialist shop, that sells disabled aids and things like that.' PM II p1

[347] 'It was made smaller in all its proportions for me. I had to go to Disability Living Centre, through the Social Services'. MY II p1

'...that chair took us a good two months to get sorted out... this was the dearest one with it being specially made and they wanted to get a standard one, out of store. She tried me with one and it was no good at all. It was completely the wrong shape in the back. It wasn't right for arm support. It was really giving me a lot of pain. So that one had to go back, and I went back to the disability living Centre... I tried everything, and then eventually, whatever make it is, it says underneath it, it was one fairly rough prototype-thing and they took clips out and pushed it all together and took both measurements and then they ordered it from the company.' MY II p1

[348] '...I bought it because it suited me, at the time.' DK II p3

[349] '...one piece of furniture was an electric recliner chair, bought specially for me when my knees were bad, arthritis... I bought it from a specialist shop, Wilkinsons in Nottingham. Its a specialist shop that sells aids for the disabled.' WD II p1

'...I bought this one from a friend, they were selling it. I bought it second hand, but this isn't a specialist chair.' WD II p2

[350] 'My recliner is an asset, and high back.' WM IIp3

[351] 'A high seat? # Indispensable, couldn't do without it... A low seat? # No, thank you. Undesirable' RM IIp3

- Sitting in a certain part of the room or house: WM IIp1, p6 & p6-7[352]

- Advice given on sitting by Occupational Therapists/ Physiotherapists: WM IIp1[353], HJ II p3[354], RM II p1[355], PM II p1[356], MY II p1[357]

'Is there anything else, that you wouldn't do without, that I haven't mentioned? # Apart from the table at the side of me.' RM II p4

'OK, Snuggy, is that indispensable? # Yes, in cold weather. I don't want it in summer, but in winter, yes thank you.' RM II p4

[352] '...I sit here in the day time. This is not for comfort, I just like to sit here because of the garden. In the winter it doesn't get used.' WM IIp1

'The one in the *[front bay]* window, has sun shining on that in the morning.' WMIIp6

'And we all love that. In the winter, that is like...cor! This morning the sun comes in beautifully.' WM II p6

'...My favourite spot used to be, when the recliner was over here, it used to be this spot. *[at the rear end of the lounge]* ...it was right by the fire and the television. So in the winter that used to be the favourite spot.' WM II p6-7

[353] '...at the hospital... they mainly advise you on the height of the chair, and the arms, and how to get out of the chair... When you get up, ...not to do that *[knuckles down, extending and straining the wrists fully]* ...you use the big joints of your arms. And to use the armrest of your chairs to help you up.' WM IIp1

[354] '...the only advice that I've ever been given is that, if I have to go to bed then I mustn't put a cushion under my knees... Nothing to do with seating. I think its gone along the lines of if you can get yourself comfortable then great, however that might be.' HJ II p3

[355] 'The O.T's and the Drs have always said sit with your feet up, out in front... Its comfort more than anything.' RM II p1

[356] 'I've had advice from physiotherapists and I have actually seen this booklet before form ARC *[Are you Sitting Comfortably?]* ...They talked about the height of the seat from the floor to make sure it was the right height for my legs. The right depth for my

13.3.3.1.2 Preferred features of participant's chair/s

- High back chair: HJ IIp2 & p4[358]

- Reclining back rest: PM II p4[359], DK II p1[360]

- Built-in lumbar support: RM II p2[361]

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bottom and between my hip and my knee. To support my lower back, to have some sort of lumber support if possible and they did advise if possible that it was adjustable. And also to look at which seating you have for which purpose your doing, which tasks you're doing. So they said you could have, something in the kitchen, something in the dining room and something in the lounge as well.' PM II p1

[357] 'That was the Occupational Therapist, what she was saying was, because of the way this room is, I was putting pressure on my neck so therefore I tend to lie down with my head on there when I am watching television. She's saying that was putting all my joints out, I'm not supporting my joints properly. What's comfortable for one joint is putting pressure else where. That's what she's told me off for.' MY II p1

[358] '...a high back chair, with wings!... I've just put a cover over the top so it matches the room... Its a very upright, old fashioned chair. I don't know what they call them? Queen Anne chair? ...Its very firm, firm back so I can sit in there if my back is hurting.' HJ IIp2

'...I shouldn't like anything that was too low at the back, otherwise what do you do with your head? You want something that's going to support your head and your neck.' HJ II p4

[359] 'When I was doing my work earlier on, I had it up like that *[with the seat slightly forward]* ...obviously when I'm just watching TV, I have it slightly backwards. When I'm wanting to rest I go right back.' PM II p4

[360] '...I can't watch the tele. or anything. I'm driving a space rocket now, are you with me? To watch the tele. now, I've got to lean forward. Which puts a curve a the top of my back and after five minutes...' DK II p1

[361] '...you said that its go a built-in lumbar? # Yes. From there to there. I had that put back in, when they reupholstered it. I made sure that was solid again. Because it does

- Head rest: HJ II p3[362]

- Wings: HJ II p3[363]

- Higher chairs easier to rise from: HJ II p3 & p4[364], RM IIp3[365]

- Lower chair: DK II p1 & p2[366]

- Use of arms to rise from seat: HJ II p3[367]

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help… We just had it as high up as you could, so that's what we did to make a wedge.' RM II p2

[362] 'I do like to rest my head.' HJ II p3

[363] '…the only reason that I've used them *[wings]* are to rest your head if your nodding off. You can nod off and you can end up with a crick in your neck. So you can lean against them and go to sleep and your head's supported.' HJ II p3

[364] 'I do find the normal settee a bit low sometimes and if I am quite bad then I do find it a bit of a struggle to get out. So I suppose something of a height, where its easier to get out.' HJ II p3

'…a chair that was too low, that I actually could not get out of, because I wouldn't be able to stand up.' HJ II p4

[365] 'A high seat? # Indispensable, couldn't do without it… A low seat? # No, thank you. Undesirable' RM IIp3

[366] 'I think this one *[a static upholstered armchair]* is lower to start with… A lot of people have told me about arthritis, and they always, like the old ones, say 'you need a high chair'. But that's for getting out of it, not when you're in it.' DK II p1

'…I know it confuses all of your research, but there isn't a lot of old people who are six foot tall, they're little like me.' DK II p2

- Forward tilting seat: CJ II p2[368]

- Footstool: HJ II p3[369], DK II p6[370], WD II p1[371]

- Loose cushions: RM II p3[372], PM II p3[373], CR II p4[374], DK II p2 & p4[375]

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[367] '...With arms that would give you an extra sort of 'umph' to get you standing. The area that is worse with my arthritis is from my legs up to my hips, so obviously I need to use my arms to get myself to standing position.' HJ II p3

[368] 'I've tried them *[seat that tilts forward]* and they are tilting forwards... I've never been very comfortable on them. I'm a bit frightened of them, actually.' CJ II p2

[369] '...And the other thing I like to do its raise my legs, so I have a little stool. To put my feet up.' HJ II p3

[370] 'I did have a pouffe actually, up until the kids broke it... Pouffe's are great, about that height...'I think, the perfect height, which takes there, I can actually feel pressure on my back, but if I actually lift my foot, only to there, it eases... I'm talking mid/lower back where my problem is... So a pouffe or a footrest, say about 7/8 inches, is all right.' DK II p6

[371] '...I put my feet up, it helps to stop my feet swelling and makes me more comfortable as well. Its not a good idea to sit with bent legs.' WD II p1

[372] 'I find if you have loose cushions, when you get in and out of the chair, you've got to be messing around with them... I used to have a National Health Wheelchair, I ended up with two pillows in that, to keep myself supported. But it was having to ask someone else to alter the pillow all the time. It was hard work.' RM II p3

[373] 'I just use a Mackenzie roll.' PM II p3

[374] '...I do like loose cushions, because you can put them in your lower back.' CR II p4

[375] '*[cushions]* In the side, or whatever. Not really behind. More so here, and I sit that side and its supporting me there.' DK II p2

- Blanket: HJ II p4[376], WM II p3[377], RM IIp1-2 & p4[378]

- Combination of features contribute to comfort: HJ II p4[379]

13.3.3.1.3 Adaptations or assistive products

- Adaptations or assistive products: WD II p1[380]

'None of it works. By the Doctor, by the physiotherapists. They've all said do this, get loads of cushions, stuff them up your back, get a towel, roll that up and shove that behind your back, in the small of your back. I've tried all of that.' DK II p4

[376] 'There's one over there *[blanket]* and I tend to use that with a heat pad...Its just like a small electric blanket and what I tend to do is put that over my knees and wrap the shawl around it and just to concentrate the heat on my knees, with my feet up and then leave it on.' HJ II p4

[377] 'I use it *[shawl]* mainly over my arms and my body. Sometimes if I lie down, its just for extra warmth.' WM II p3

[378] '...You've got your fleece thing over the top. Do you actually wear that? Because I've noticed that it has a zip on it. # Yes. That's why its left like that... its bought. Its German make. Its got a zip up the front, you zip it up. If you are short enough, you can have the buttons around your feet. But I use it high up on my shoulders. I don't bother zipping it up, its got press studs at the front... Made in Germany... You can make them flat and lie them over the back of the settee, when its not in use, but while its draughty... and its easy to get in and out because its big.' RM IIp1-2

'OK, Snuggy, is that indispensable? # Yes, in cold weather. I don't want it in summer, but in winter, yes thank you.' RM II p4

[379] 'So out of all of the things you mentioned, is there anything that is more indispensable than others. Or is it to do with all of the things collected together?
I think its more a general mixture.' HJ II p4

[380] 'The chair I'm currently using because my electric recliner's broken, I've got blocks under it and I've got a high, firm cushion on the seat, to make it a lot higher for me. I

- Triangle cushion: WM IIp1[381]

- Heat pad: HJ II p4[382]

- Thicker foams put on chair arms: RM II p1[383]

13.3.3.1.4 Surfaces & storage

- Use of surface: WM IIp5[384], HJ II p5[385]

- Type of surface: WM IIp4[386], HJ II p5[387], MY II p1[388], CR II p5 & p2[389]

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also put a cushion in the small of my back to make my back comfortable as well. So I've adapted it slightly.' WD II p1

[381] '...that triangle cushion, and I move that to wherever I'm sitting. I'd even bring that in here sometimes. That's for my lower back, mainly for that.' WM IIp1

[382] '...I tend to use that with a heat pad... Its just like a small electric blanket and what I tend to do is put that over my knees and wrap the shawl around it and just to concentrate the heat on my knees... You can use it anywhere, you can sit on it, put it around your neck, you can do what ever you want with it.' HJ II p4

[383] 'I had extra padding put on the arms when it was reupholstered. It was well worn down, so I had thicker foam put on the arms...' RM II p1

[384] 'Mainly for drinks, or if I'm reading, for a book.' WM IIp5

[385] 'Certainly somewhere to put a cup or a drink. The things I use like this surface I use for a newspaper or a book.' HJ II p5

[386] '...I usually move the one *[table]* over from by the door... We always have a table.' WM IIp4

[387] 'There's a *[small side]* table there, there's usually a table there for my books...in the other room by the side of the bed, I usually go in there when I'm not very well really, and

- Use of trays: RM II p5[390], HJ II p5[391]

- Type of storage: HJ II p5[392], PM II p5[393]

- Pocket for TV remote control: WM IIp5[394], MY II p4[395]

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that means I've got access to a telephone which is right be the bed and I've got a light as well.' HJ II p5

388 '...I've got one of these tables that go under, on castors and tip up, for studying on.' MY II p1

389 'That stool doubles as a coffee table, I put a cup on.' CR II p5

[Do you have a surface nearby?]
'# Yes, this rickety table that I keep knocking over, when I get up.' CJ II p2

390 'Yes, I've got a bean bag tray on my knee. I sit with my feet up and have a bean bag tray on my knees. Most things are done from here. I eat from the chair... I've been known to do jigsaws from it and cake icing.' RM II p5

391 'Something to eat from... that's not quite so important... I have a tray. But I consider that something separate really.' HJ II p5

392 'I certainly find this useful *[sewing box?]* I've got a space, where if I'm working on something, I can just put it out of the way.' HJ II p5

'...I've also got a magazine rack there. This is also a sewing box as well. It opens up *[the top hinges open, giving top access]*.' HJ II p5

393 '*[Laughs]* I'm surrounded by things. I've got a system... this little box, as you can see I keep my... like that in it. Its also useful when I've done my correspondence, it goes over there and I know that I've done it. Its just a sorting system really.' PM II p5
394 '...This was like just a piece of material, or I don't know whether it was in the settee or not, but its was just a pocket for the remote control... something for the remote control, we're always loosing that. We've got three, television, video and CD. They're all over the place.' WM IIp5

- Keeping things to hand: MY II p5[396], DK II p7[397], CJ II p2[398]

- Stick storage: WM IIp8[399], DM II p12[400]

13.3.3.1.5 Purchasing furniture

- Trying furniture before its purchase: PM II p9 & p10[401]

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[395] 'I wanted something like Peter's... We wanted to put a pouch in here, for things like this that we kept dropping, but she *[mother-in-law]* couldn't manage it. Its useful, say if you are reading a novel, you can just pop it there, and you haven't go to keep... I'm forever dropping things. I just keep things safe.' MY II p4

[396] '...when you're studying, you've got so much stuff, you can't keep getting up and down for it when you've in pain, so I just sort of spread myself around and have it all there. I just felt that something that you could put things into would be quite helpful.' MY II p5

[397] 'Well, a table, to the side of the chair, big enough to get... What kills me is getting up and down. Its all right if someone else in the house, a bit like when the phone rings. I could do with phone next to me and then the remote controls and all the rest of it. I've just noticed in that booklet in there what is ideal, is somewhere to put all of your papers and stuff.' DK II p7

[398] '...I've got my make up and stuff in so I don't have to keep getting up...' CJ II p2

[399] 'Usually in a corner. I put it in a corner. Or behind a radiator.' WM IIp8

[400] 'I can't up and over it. That is ideal to put it in, but just to slot it in ...But there is no way I can get that in. I do really need it. I will have the stick or I can't move...' DM II p12

[401] '...if I did buy a chair again I would buy one where you can use the footrest without it reclining. I never thought of it. When you are in the shop trying them all out, they are not in your house are they? So there's load of room and they are stuck in the middle of the shop.' PM II p9

'...they were very good at that *[furniture shop]* place, they actually brought you a coffee and things, very sensible and said just stay there for quite a while. He just completely

- Importance of choice when purchasing furniture: PM II p2[402], WD II p2[403]

13.3.3.1.6 When in pain

- What participants do when they are in pain: HJ II p1[404], RM II p5[405], WM IIp7[406], PM II p6[407], MY II p6[408], DM II p4 & p5[409], DK II p9[410], CJ II p3[411]

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ignored me and got on serving other people, so I was just sitting there, doing my own thing having a cup of coffee, so I was there for quite a while. But when I went to places like Keep Able and that sort of places, I don't suppose I spent very long sitting in them, because they come up and sort of say 'Can I help you' and you feel like you've got to get out of the chair for some reason. I always felt embarrassed. Its the same when you're buying a bed, you don't spend enough time lying on the bed.' PM II p10

[402] 'I had a choice of this back bit, there was a slightly smaller version that only came to about there. So this is the bigger winged version, that slots into the back of the chair and you can actually change it.' PM II p2

[403] 'When I bought this one *[electric recliner]*, I didn't have any choice at all, this was the only one they had in the shop. There was no choice at all... No choice of upholstery... Its not really the sort of thing that I would normally choose... I wouldn't choose anything like that. Because I don't like any of the ones I've seen, really. I don't the like the style of the ones that I've seen. They seem to be pitched at elderly people. Like you said before they are all sort of floral or flowery, or either that or they are Draylon, which is vile.' WD II p2

[404] '...the other time I use it, is if I'm awake at night, and instead of keeping A awake all night, I come down here and I can sleep here. There's a quilt on the bed. Its all made up, so its all ready to use it. So I come down here and only one of us stays awake all night...' HJ II p1

[405] 'I'm better kept warm. I tend to, if I'm really achy, go to bed and relax, pick a book up. Once I'm sat propped up on my pillows, with my legs out straight, I'm fine. That's what I usually do to take the easy way out. That's what I do for an afternoon and that way I can get through the day without pain killers... If I don't do it then I'll suffer tonight, I can't sleep, get the fidgets and get over tired. So I find it suits better to have an hour in the afternoon and I don't need to take the pain killers, I can stand it.' RM II p5

- Describing pain: DK II p4 & p11[412], CJ II p4[413]

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[406] 'If I'm really ill I go to bed, Lucy.' WM IIp7

[407] 'I like warmth when I'm achy. I like to recline or else go to bed. Most of the time I try to stay down here now that I've got this chair. I used to go to bed but I didn't like the feeling or missing out on the family. So I do tend to try and relax.' PM II p6

[408] 'I do tend to bend them *[joints]*. I know you are not supposed to. I do find it very difficult, I do try... I'm a curl-a-upper... I hate splints, I think they do more damage than good. When my wrists were bad, I slept four years, every night with splints on both hands and they're fixed.' MY II p6

[409] 'I'd say a combination *[rest and exercise]*. I'd say I've got to be on the go, I'd say as well. It important to achieve, yourself, to get yourself motivated and not think about it. To think ahead, not just mope.' DM II p4

'Its the frustration part of it. You're mentally all there, but you can't do nothing. I've got a lot of people doing it for me. They know what I'm going through and say 'you better go upstairs and lay down, before we all start World War Three.' DM II p5

[410] '...So all the time I'm sitting down, I'm moving myself around really, distributing the pain between the three locations. After a while, I get fed up with all of this and go and lie down...' DK II p9

[411] '...warm doesn't always do them *[joints]* good, so sometimes I have to have cold of it, like my feet and that... I know it you get too cold, it sort of how you hold yourself that makes you ache. You can feel your neck and everything, can't you?... if I'm warm, I'm OK. But if I still ache when I'm warm I find cool's better, than hot. If I put a hot water bottle on, they then to hurt more. So its better with a cool pack.' CJ II p3

[412] '...I'm on about something that is 24 hours a day here. It don't ever leave you alone. It wakes you up at three in the morning, that type of nagging, on-going, gnawing thing. These different exercises and these different chairs, or wherever we are sitting, its with me all the while. The only time it isn't is when you're unconscious. So I've never found a chair where I'm 100% comfortable, I don't know if I ever will.' DK II p4

'I've named them, pain attacks, when its unbearable, its like someone's got an ice axe in my back sometimes. I can't describe it to anyone other than that. Its a dreadful pain, they

- When pain is intense: keep out of the way: DM II p5[414], DK II p11[415]

- Sleeping: HJ IIp1 & p3[416], RM II p5[417], WD II p3[418]

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don't last long, but it doesn't matter what I do then. It doesn't seem to go away... Its that bad.' DK II p11

[413] '...I feel like someone's broke my legs off at the ankles and I'm just walking on the bear... as though everything has dried up in them.' CJ II p4

[414] '...Its just the frustration mentally. The frustration of it that you have got to accept. You want something done: you need to get a cup of tea. You can't do the cup of tea so you've got to wait for others. Now that waiting for others is embarrassing and frustrating in itself. So you're going on, not for today's frustration, but going on a couple of days before... And then you go in to a depression part. 'I can't do this, stop doing that'. The best thing to do is to go to bed and ignore the lot and just go away into a room where no body is bothering you. But you're in agony still. And you still don't get your cup of tea! I don't know, with me being young, its just not right.' DM II p5

[415] I just had to get out of the way. I tried everything to shift it *[the pain]*. In the end I ended up on our bed, with the machine *[TENS?]* on. I was up there for about two hours.' DK II p11

[416] '...This is a single bed. I've got lots of cushions, so sometimes in the afternoon I'll come in here and have a rest, and I can either take all of those *[cushions]* off and use it as a bed, ...and have a sleep. Or sit, half lying down and watch the TV...' HJ IIp1

'...the only reason that I've used them *[wings]* are to rest your head if your nodding off. You can nod off and you can end up with a crick in your neck. So you can lean against them and go to sleep and your head's supported.' HJ II p3

[417] 'That's what I do for an afternoon and that way I can get through the day without pain killers... I find it suits better to have an hour in the afternoon and I don't need to take the pain killers, I can stand it.' RM II p5

[418] 'I do sleep in the chair *[recliners]*.' WD II p3

- Raising chair for flare-up: WM IIp2[419]

- Adapting existing furniture post operatively: WM IIp3[420], DM II p13[421]

- Arthritis affected by changes in weather or season?: HJ II p7[422], RM II p6[423], PM II p6[424], MY II p9[425], CJ II p4[426]

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[419] '... if I'm really ill, I've got the legs, and I do put them on the settee... if I use them on this chair, I had to have double the cushions to bring... 'Cos I said to you that chair is really too long in the leg... The problem is that they don't fit on the recliner.' WM IIp2

[420] 'So you put the raisers on that chair with two back cushions, and then is it the right length? # Yes, its quite comfy then. That's how I had it when I had my hip *[replacement operation]* done.' WM IIp3

[421] 'I've had my ankles done. The last two years I could have used that! I've had a wooden plank just under the seat with a pillow on.' DM II p13

[422] 'Does it make a difference to you, the time of the year? # It can do. If I get very cold, you know, very damp. I find that difficult. And also the absolute opposite. When we had that spell in the summer, that was very, very humid, I found that difficult too. Heat's OK, but not when its very humid.

Dry Heat's better? #Yes.' HJ II p7

[423] 'The very hot make me worse, and so does the cold and wet.' RM II p6

[424] '...It can either be going from cold to hot, in the summer, when its got very hot fairly quickly this summer and I had a flare up. When it goes from hot to cold. It takes a while to stabilise. So perhaps at least twice a year I notice a difference. I certainly flared up this year when it got cold.' PM II p6

[425] 'Cold drizzly weather. If its drizzly foggy weather - I would rather have crisp frosts. A clear day like today I'm better but if its misty and murky, it stops my knees. My knees are like a weather gauge, I get real pain. I can't tolerate damp at all.' MY II p9

[426] '...I feel better in sort of Spring/ Autumn, so it isn't hot and it isn't cold.' You now if you have a really crisp sunny day, I'm at my best then. In the summer I feel like someone's broke my legs off at the ankles and I'm just walking on the bear... as though

- Having arthritis and doing exercise: PM II p6[427], MY II p7-8[428], DK II p4 & p11[429]

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everything has dried up in them, so I'm not very good in the summer. And the winter you don't feel very good anyway. I'm not a winter person.' CJ II p4

[427] 'I hate exercising… It frightens me to do it. Because I think when the joints are inflamed, I don't know why, but it just seems wrong to exercise them.' PM II p6

[428] 'I do push myself… I mean my stair lift is there, but I use the stairs as much as I can. I've got to be really bad. I think its really important… I feel exercise, I mean it hurts but I've got to do it… I think exercise relieves me. I certainly makes me feel better… I hate going to bed. I am not one of these people who take to my bed very easily… I just refuse to give into it. I don't accept the disease model.' MY II p7-8

[429] 'Its the same with exercises, they've given me all these exercises to do. I've had arguments with them. I was doing the exercises that they told me and I couldn't walk for two days and I'd go back to the hospital and they said, 'have you been doing the exercises? Where were you yesterday?' 'Well, the reason I wasn't here yesterday, was because I'd done the exercises'. They're not working, they've got to give you something else to do. 'It doesn't come cheap, Physiotherapy'. What they're saying is that you've got to hurt yourself to get better. But they were putting me in a box. It went on for months. I'm a big believer in that they know best. I haven't just put my head up in the air and said that they are doing me no good… *[someone was a the door]* DK II p4

'…it is exercise that brings it on… Having said that, the actual exercise that I use, which are back extensions, leaning back and side to side. One of them it tends to free it up.' DK II p11

13.3.4 Footnoted highlights from diaries kept during, & interviews after, testing the prototypes

13.3.4.1.1 Using the prototypes

- Furniture found to be useful during testing period: HJ dp6[430], CJ p6[431]

- Volunteer benefited directly from participating in the testing process, finding that the footstool beneficial and having a chance to experiment and be critical about the furniture being used: CR[432], MY dp3[433]

- Cleaning the prototype furniture: DM p10[434], PM p12[435]

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[430] 'After removal of furniture *{from diary}*
During the following days after the furniture had been returned to you, I realised how useful the 'set up' had been to me.' HJ dp6

[431] 'I thought it was very handy, because people could sit on the stool, the chair. It doubled up as two chairs.' CJ p6

[432] 'I think its very significant that I have discovered the use of footstools. Having lower back problems, I do benefit from putting my feet up, I've found, thanks to the… using the prototype.' CR

[433] '29.11.97
I feel that I learned quite a lot from taking part in this research. It focused my mind on the problems I have encountered with furniture design since having R.A. I think I can be more objective about what I want from a chair in the future - what points to look for and what points to avoid.' MY dp3

[434] '…with it being wood, you would clean it anyway, wouldn't you?' DM p10

[435] 'Yes, I cleaned the wooden arms bits some candle wax got spilt in there over Christmas…
Was it the timber or the acrylic discs? # Well I cleaned them both… we put the vacuum over it a few times. It never looked really dirty…' PM p12

- Prototype chair dubbed 'Star Wars chair!': CJ dp1& p4[436]

- Cats enjoyed the furniture!: MY dp7[437], CJ p5[438]

- Importance of choice, so that the furniture is finished to individual preferences: HJ p9[439], CJ p5[440]
- Prototype furniture is considered big: DM dp4[441], DK Questionnaire p4[442], CJ p4[443]

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[436] 'Day eight: 20 December1997
My 10 years old nephew thought he was on a 'Star Wars' chair.' CJ dp1

'My sister came over, with her lad who's about ten, and our Roger thought it was like being in space, on the tele. on Star wars, when they are sitting when they've got the controls pads they thought it was wonderful. *[laughs]*' CJ p4

[437] 'Day four, 20.11.97
...I have observed that all three of the cats have actually sat on the chair, or gone to sleep on the chair or played underneath the chair and the stool and they haven't attacked the material at all. It seems what few cat hairs were there seem to lift off quite easily, so it seems from a wear and tear animal point of view the material is quite durable.' MY dp7

[438] 'The cat thought they were wonderful, because it could sit on one and just fit in nicely on it. The cat loved it. He loved the whole lot, that was his chair you'd come in and he'd be snugged on it and the stool he'd lie on that. It was the cats.' CJ p5

[439] 'Is choice an important thing to you? If you were thinking of buying something new, fairly substantial cost-wise, would you like to see it offered in a range of things?
Yes, definitely, because if you are going to use it as lounge furniture I think that its important that it matches with everything else and doesn't stand out as being different.' HJ p9

'...if someone had got a lot of dark furniture, it would be nice to offer it in perhaps a light or a dark colour.' HJ p9

[440] 'You could use it *[the cabinet]* in a living room perhaps different wood, you'd have it to tone in with what you'd got, wouldn't you.' CJ p5

13.3.4.1.2 Chair

13.3.4.1.2.1 Prototype seat too hard

- Prototype seat too hard: HJ dp1[444], RM p1, 3 & dp2[445], MY p10[446], PM dp1 & p5[447]
- Pain in the bum!: RM p1[448], MY dp2[449], CJ dp1 & p2[450], PM dp1, dp2 & p5[451]

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[441] '24.11.97
Its got to be in a room which is empty with no furniture in because its big.' DM dp4

[442] 'Takes up room in small house' DK Questionnaire p4

[443] 'They all said, 'Its big!' because it was bigger than the furniture, 'than we thought'... CJ p4

[444] Day one: 21.10.97
'I'm noticing that the seat itself is quite hard.' HJ dp1

[445] 'The seat was very firm.' RM p1

'I did find the seat quite hard' RM p3

'Day seven: 9.11.97 *[Sunday]*
Found chair seat quite hard for a long period.' RM dp2

'Day eight: 10.11.97
Chair is still very hard for long periods.' RM dp2

[446] 'I really would have liked a softer seat.' MY p10

[447] 'Day One: 11.12.97
Uncomfortable to sit for long periods due to firmness of chair seat.' PM dp1

'...I said that the seat needs to be of a thicker foam, or more cushioning effect because I felt quite numb quite quickly. It felt hard.' PM p5

- Hard seat was OK: WD p8[452]

- Unable to rest on chair: RM p5[453], WD p2[454]

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[448] '...that's where I noticed it first, a pain in the bum. That really aching. It was the leg with a tingling...' RM p1 *[cream prototype]*

[449] 'Day 3, 19.11.97
I have inflamed my left ischio gluteal bursa- this happens if I sit too long on hard seats.' MY dp2 *[red prototype]*

[450] 'Day two: 14.12.97
Sat for nearly all afternoon with legs outright. It made my bum numb after a time.' CJ dp1 *[red prototype]*

'I found if I was sat for a long time with my legs up then my bum got numb. I've put it in the diary, but I am talking about four or five hours, a good period, I was sitting.' CJ p2 *[red prototype]*

[451] 'Day 2: 12.12.97
...Back ached after about 10 mins or so. Moved cushions around. Bottom became numb soon after. Cushions became a bit of a nuisance, sliding down into wrong position.' PM dp1 *[cream prototype]*

'Day 5: 15.12.97
Sat in the evening to watch TV and have drinks. Seat felt hard under bottom after about 10 mins.' PM dp2

'...I said that the seat needs to be of a thicker foam, or more cushioning effect because I felt quite numb quite quickly. It felt hard.' PM p5

[452] '...it was harder, but I didn't really mind that.' WD p8

[453] 'I would never say I was resting in it.' RM p5

[454] 'Sometimes I felt restless, because I was wanting to recline, and other times I felt quite comfortable... I mean it was OK, when I was sitting upright to watch TV, or to do anything, or to have a cup of tea of whatever, but when I was feeling quite sleepy and I

- Going to bed: WD p2[455]
- Uncomfortable in chair/ restless: MY dp5 & p3[456], DM dp1[457], PM p4[458]
- Disappointed chair was uncomfortable: PM p9[459]
- Eating from chair using tray: PM dp1[460]

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wanted to really relax then I felt restless because I couldn't tip back like I'm used to…
'…I was restless, when I wanted to have a lie down, then other times, I was quite comfortable.' WD p2

[455] 'I kept nipping to bed to lie down' WD p2

[456] 'Day two, 18.11.97
…I can get lumbar and thorasic spine OK, then I can't get my neck right and if I try to get my neck right I find that the material is very slippy and I shunt forward and I just find that I can't get comfortable in the chair.' MY dp5

'…I did feel on the go all the time' MY p3

[457] 'Day one: 17.11.97
I was very restless on upper part of body of my neck. I had to adjust the neck cushion to short cushion.' DM dp1

[458] 'I was restless… throughout… It was mainly to do with the seat part *[too hard]*
When I used the footstool I was fairly uncomfortable.' PM p4

[459] '…expectations unfortunately it didn't live up to those. When I first saw it, when I first sat in it, when you were here. I thought this is great, I thought this is going to be really nice and fairly soon I wasn't as comfortable as I thought. It wasn't up to what I'd expected.' PM p9

[460] 'Day One: 11.12.97
Ate a meal- needed a lap tray.' PM dp1

- Eating from chair easy: CJ p6[461]

- Eating from chair difficult: MY dp5[462]

- Gas stem: CR dp1[463], CJ dp1& p4[464]

- Travelling across the room on the chair: CR dp1, dp2 & p4[465], DM p6[466]

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[461] '...I normally eat my dinner sitting on it, I could do that quite easily.' CJ p6

[462] 'Day two: 18.11.98
...Because I can't reach my feet to the floor I can't form a lap to put the bowl on so I wasn't able to eat on it.' MY dp5

[463] 'doesn't swivel.' CR dp1

[464] 'Day eight: 20.12.97
Everyone who sits in the chair thinks it swivels.' CJ dp1

'So they were a bit disappointed. For you, would it *[the gas stem]* feel better to swivel, or not? # I think a couple of times I thought yes, to swivel, to get in the drawers or something not so much as... Once I got used to it not swivelling I was OK with it. But I noticed a few sort of sat in it and the first thing they did was try to swivel. It was like, it doesn't swivel, don't make it swivel!' CJ p4

[465] 'I'm sitting down with the brakes off, because I like swivelling it round.' CR dp1

'When whizzing the chair from one position in the room: from normal relaxing position to working position in front of the PC. I notice that one of the wheels doesn't work very well.' CR dp2

'So, you wanted the mobility. You wanted to be able to scoot round to go and get things. # In graphic design studios, you would have, say PC's there and PC's there and you would go scoot, scoot, from one to the other.' CR p4

[466] 'That's why you've got the wheels, that's why its excellent, you can move it about.' DM p6

- Would prefer an electronic raiser to assist with getting off the chair: DM dp3[467]

13.3.4.1.2.2 Chair too high

- Chair too high: DM dp3[468]

- Could get off seat unaided: WD p9[469], CJ dp2[470], PM p9[471]

- Could not get off chair unaided: DM dp3& dp4[472]

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[467] 'But when it comes to grabbing hold *[of the arm, to get up]* I wish like I said there was an electric button that threw you off the chair.' DM dp3
'24.11.97
If you could get a push button for automatic, to push you up off the chair, it would be very nice…' DM dp3

[468] '24.11.97
…and the chair a bit lower in height.' DM dp3

[469] 'Yeah, I didn't have any trouble to get out of it. I found it very easy to get out of, because it was nice and high.' WD p9

[470] '[After prototypes had been removed?] *{from diary}*
Sitting in "the chair" has also made me realise how ungainly I am getting up from the settee. After the ease of getting out of the chair I now find getting up quite difficult.' CJ dp2

'[After prototypes had been removed?] *{from diary}*
It was a lot easier to get up from.' CJ dp2

[471] '…it was easy to get in and out.' PM p9

[472] '24.11.97
…I still have to have somebody to change the cushion position, because I can't get off the chair...' DM dp3

'24.11.97

- Furniture too big: MY p2m, DM dp5[473]

- Chair fitted in: WD p6[474]

- Set chair to lowest setting: RM dp2 & p6[475], WM p11[476], PM p3[477]
- Higher than other furniture: WM p1[478], CJ dp1 & dp2[479]

I definitely need someone to get me off the chair because I get stuck with having little legs...' DM dp4

[473] '...I just feel its just a normal thing for me. Because every time I sit into furniture, its always too big for me.' MY p2

'Without them, *[cushions]* when I taken them all *[cushions]* off and used it *[chair]*, I've got to pull right back as I've said, my feet aren't touching the floor so it aches my legs but its really comfortable with the cushions' DM dp5

[474] 'Apart from sleeping: I would say apart from that it was fine. I was able to put my cup of tea on it, and my remote control on that side, on those things. So yes, it was able to fit in quite well.' WD p6

[475] 'Day eight: 10.11.97
... Put it *[chair]* on its lowest position...' RM dp2

'She lowered it down to the lowest position and it didn't seem to do any... With going lower, I seemed to go further back in the chair ...' RM p6

[476] 'I think a lot of it is the height of it, Lucy. If you could get your gas stem lower it would make a big difference. Even I you could sit in the chair and put it at its lowest. I think that would be brilliant.' WM p11

[477] 'The fact that you could have it *[chair & footrest]* high or low was indifferent to me, because I kept it in the low position all the time.' PM p3

[478] 'The height. Its because you're above your furniture, and when you're are like I am now, going through a pretty good phase, you don't want to feel high, because I can sit on

- Sitting above other people: WM p1& p7[480], MY p5[481], CJ dp2[482]

- Chair too high and uncomfortable: WM p5[483], DM dp1[484]

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my normal chair. I'm not criticising. If you can bring it down any lower, but you say you can't can you?' WM p1

[479] 'Day one: 13.12.97 *{from diary}*
Felt strange to be sitting high up.' CJ dp1

'Day two: 14.12.97
Still feels funny being higher than the other chairs.' CJ dp1

'[After prototypes had been removed?] *{from diary}*
If my other furniture had been the same height I would not have felt so high up and perhaps have been more comfortable.' CJ dp2

[480] '...you don't want to be sitting up there above everybody else.' WM p1

'I felt like I was above everybody. Regal's the word, not elegant. But you do get used to it. I remember thinking, I'm not going to get used to this.' WM p7

[481] '...he said 'God you look high up.' 'Cos he wasn't used to seeing me so high up... It is quite unusual for me to be on a par with him, eye ball to eye ball, so that was his main comment.' MY p5

[482] '[After prototypes had been removed?] *{from diary}*
I found if someone was sitting lower down on the chair next to me it was strange looking down on them.' CJ dp2

[483] 'The chair is just too high, Lucy. I means my feet dangle. The back doesn't go back does it. Its uncomfy *[sic]* like that to me.' WM p5

[484] 'Day one: 17.11.97
Sitting position my feet did not touch the ground I was very uncomfortable. Me legs on the footstool or footrest was very relaxing.' DM dp1

- Could only use chair with footstool: DM dp1[485], WM dp1[486], MY dp4[487]

13.3.4.1.2.3 Wings

- Did not use wings: HJ dp5[488]

- Wings too high: WM p3[489], HJ p1[490], MY p2[491]

13.3.4.1.2.4 Chair back

- Built-in lumbar support: RM p7[492]

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[485] 'Day one: 17.11.97
Sitting position my feet did not touch the ground I was very uncomfortable. Me legs on the footstool or footrest was very relaxing.' DM dp1

[486] 'Day three: 23.10.98
Still need to use the foot stool to sit on chair.' WM dp1

[487] 'Day one: 17.11.97
...I was sitting trying to put my feet on the floor and my feet weren't reaching so I then used the foot stool.' MY dp4

[488] 'Day ten: 30.10.97 *[from tape]*
One comment I didn't make was on the wings... I didn't really use them.' HJ dp5

[489] 'My idea of using the wings was so you actually fall asleep. But they seemed to be too far out they needed to be more...' WM p3

[490] '...when I did try to use them I thought they were a little bit high. Maybe they could be shaped so that they come down a bit lower...if you slouch down in the chair the bottom finishes by your ear, so it needs to come down a little further so it would offer more support for your neck and shoulders.' HJ p1
'...*[chair should provide]* a general support from the side.' HJ p1

[491] 'They *[the wings]* were too high for me.' MY p2

- Tall back good: HJ dp1[493], PM p3[494]

- Bag did not hang well on back of chair: RM p11[495]

- Need for more back adjustments: CR dp1, dp2, dp3& p5[496]

- Need to be able to tilt back forward: PM dp3 & p6[497], RM p2[498]

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[492] 'I personally like a built-in lumbar support in my chair, because it doesn't move then.' RM p7

[493] 'It is nice when you lean back to have your head supported.' HJ dp1

[494] 'A tall back was indispensable.' PM p3

[495] 'And I found it was hard to attach my handbag to it. I keep my handbag there, over the back. I could do it but it went right round the back of the chair and I'd got to get up to get it. Where as this, I can swing it over the arm and get what I want out. It wasn't a problem, but it was just not so convenient. When you're writing your cheques and I just wanted to grab my bag…' RM p11

[496] '…and the back isn't adjustable' CR dp1

'3.12.97
'…I could sleep in this chair, if it had an adjustable back which I quite often *[spend]* time in car chair…' CR dp2

'I'd unwind in it better if the back sloped backwards, or was adjustable, in a backwards way.' CR dp3

'It hasn't got an adjustable back. My ideal chair, is the one I have in my car. It seems like it is ergonomically designed.' CR p5

[497] 'Suggestions
Would it be a good idea to be able to tilt the back of the seat so as to sit more upright, feet on floor for certain tasks? E.g. writing, playing games, doing children's hair etc..' PM dp3

- Recliner: WM p5, 6, & p13/4[499], HJ dp2 & 5[500], CR dp2[501], WD dp1 & p2[502], PM p8[503]

'My feet could touch the floor, but if I was leaning back, like that they didn't particularly want to, but I could. My toes were on the floor. But when I do tasks I don't keep my back here, if you are writing or doing something you can lean forward. So with this chair, you can actually bring it forward with me.' PM p6

[498] '...I like to be like this, so I don't go back.' RM p2

[499] 'The chair is just too high, Lucy. I means my feet dangle. The back doesn't go back does it. Its uncomfy *[sic]* like that to me.' WM p5

'LP: From your experience of using that, would you use a footrest with your chairs now? # Well, I use my recliner now.' WM p6

'...if you're going to make it for a home then its got to be more luxurious... Recliner, or something that moves back.' WM p13/4

[500] Day two: 22.10.97
'I've found it almost impossible to be able to lie back enough to sleep.' HJ dp2

Day Two: 22.10.97
'I think it would be really nice if the back of the chair would perhaps recline a little, just to give you that extra little bit for you to relax.' HJ dp2

'Day ten: 30.10.97 *[from tape]*
...if the back of the chair would recline, I think, certainly in my case, that would be brilliant because it would allow me to sleep and be more comfortable generally, in the chair.' HJ dp5

[501] '3.12.97
I have a lower back pain. I wonder if it would go away, I feel sure that it would go away if I could slide the back of the chair right back, as I can with the car seat of the car.' CR dp2

[502] Day one: 5.12.97

13.3.4.1.2.5Arms

- Adjustable arms: CR p3[504], MY p4[505], DM dp6, dp2 & dp3[506]

13.3.4.1.2.5.1 Arm discs

- Used arm discs: CR p7[507], WM dp1[508], WD p1[509], CJ dp1 & p5[510]

'I normally sleep during the day in my reclining armchair. I couldn't get comfy enough in this chair to sleep as it is too upright, so I went to bed instead.' WD dp1

'Sometimes I felt restless, because I was wanting to recline, and other times I felt quite comfortable' WD p2

[503] 'It didn't fit everything that I do. Because I do recline in this one, and try and have a rest in the afternoon.' PM p8

[504] 'Adjustable arms would be a good idea.' CR p3

[505] 'I thought the curving [of the arms], it was nice, very aesthetic, pleasing to the eye.' MY p4

[506] 'Its a shame you couldn't lift the arm rest up, so that you don't have to lower your arm down if it aches, and when you want to lift your arm up, to get rid of the pain and get rid of the swelling. My hand swells up. It would be idea, like the footrest, that does to your legs.' DM dp6

'Day seven : 24.11.97
The sitting down position of my arms movement I could rest the whole arms easily.' DM dp2

'I've found the arms rests on the chair very useful because they are big, spacious, and easy to rest of my arms on.' DM dp3

[507] 'I did quite like the way that you could put a cup on the arm and I did used that.' CR p7

[508] 'Day 3: 23.10.98
Have found the drinks tray very useful.' WM dp1

[509] 'the things you put your cup of tea on? They were quite good, yes. Yes, I would say they were useful.' WD p1

- Only need RH arm disc: WM p4[511]

- Arm discs conveniently placed: MY dp4[512]

- Arm discs inconveniently placed: CR dp4[513], DM dp1[514], CJ dp1 & p4[515]

- Upholstered arm should be longer: CJ p7[516]

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[510] 'Day one: 13.12.97 *{from diary}*
Handy to have somewhere to put a cup down.' CJ dp1

'...but again they were dead handy for the cups...' CJ p5

[511] 'I thought you didn't need the left hand one. Depending on which side you put your tray. Not your tray... your drawers...' WM p4

[512] 'Day One: 17.11.97
I think the positioning of the rests for the cups was quite good because I had my mug on the left hand side and I was able to put my book on the other one...' MY dp4

[513] 'Friday the 7th: (12.97) I have noticed sometimes having a cuppa and a sit down. That the circles: the doughnut rings, are a bit inconvenient. They could be a bit further out, in a different area....' CR dp4

[514] 'Day two: 18.11.97
I still couldn't put hot tea down on the chair position..' DM dp1

[515] 'Day five: 17.12.97
Sat watching TV found that the round arm discs were in the way sometimes. I had to put my elbows too far back to be comfortable, but they are still handy for cups etc.' CJ dp1

'...I had to sit with my arms really back which was a bit uncomfortable for me...' CJ p4

[516] 'Apart from the arms could be doing with longer that way *[their length]*, even for me and I'm not that big.' CJ p7

- Arm discs uncomfortable under hands/ arms: RM dp1[517], HJ dp2[518], MY dp6[519], CJ p4[520], PM dp2[521]
- Prefer fabric arms: RM p4[522], PM p5[523]

- Swivelling arm discs/ surfaces: RM dp2 & p3[524], HJ dp2[525], MY p3-4[526], PM dp2 & p5[527]

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[517] 'Day two: 4.11.97
Find wooden arms are very hard on my arms.' RM dp1

[518] Day Two: 22.10.97
'...the little wooden panels on the side of the chair, when you're trying to relax, or indeed go to sleep, I feel that I might be banging my hands on the wood... I have found that I've almost startled myself if I have tried to nod off then I've hit something hard.' HJ dp2

[519] 'Day three: 19.11.97
'She felt that at night when she was watching television, she would want to have her arms on the softer part not putting them on the cold wood.' MY dp6

[520] 'I found I was sitting with my arms on the wood and again thinking either it was cold or it hurt after a bit.' CJ p4

[521] 'Day five: 15.12.97
Began to dislike wooden 'trays' under elbow.' PM dp2

[522] 'I would rather have the material arms, because of getting up and down. 'Cos you see, I can get my hand over like that... And its not hard on the finger joints.' RM p4

[523] '...I would have preferred to have leant on the upholstery I think.' PM p5

[524] 'Day eight: 10.11.97
...The wooden arms would be good if they dropped over the side and then round to the front. As *[they are]* too far back for me to use...' RM dp2

'I said it would be good if they dropped down flat, and you just pulled it round. Because they are a nice size for doing that: just putting a letter on, or for just putting something on...' RM p3

- Removable arm discs/ surfaces: MY p3-4 & dp6[528], CJ p4[529]

- Arm discs for writing: RM dp1[530], HJ dp2[531], CJ p6[532]

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[525] Day Two: 22.10.97

'…I don't know if these could be made so they slide over the side of the chair or something like that.' HJ dp2

[526] I think my neighbour thought that as well. She was trying to push them, she was saying 'do they swivel away?'. Because they were round, it looked as thought they ought to swivel away' MY p3-4

[527] 'Suggestions

Wooden arm "trays" should be able to swivel. Eg. To come across for writing/ eating etc. and completely out of the way when needed.' PM dp2

'…the wooden arms trays should be able to swivel… Yes. Because they got in my way. So I thought if I could just swivel them out of the way... I have suggested that they might come across for writing and eating. There are conference chairs like that. I think that's what I was probably thinking of.' PM p5

[528] '…what kept catching my eye were the arm rests. Because they are so unusual, I kept finding myself, every time I looked at it, especially coming down stairs you see it. I think with it being such light wood. I felt if I was asking for that chair to be made, I would like those to be removable. Say, if you were having visitors…' MYp3-4

'Day three, 19.11.97

'She felt she wanted to keep pushing the cup rests to one side. That they ought to swivel away or be removed. She kept trying to fiddle with them.' MY dp6

[529] 'I suppose you could take one off, until you were a bit better. But that was just for sitting and relaxing, as opposed to sitting normal…' CJ p4

[530] 'Day two: 4.11.97

…I turn and use left side to write on.' RM dp1

[531] 'Day Three: 23.10.97

- Arm discs clashed with drawers: WM p4[533]

- Cup discs marks where to put drink: WM p5[534]

- Can't get arms back far enough to use discs: RM dp1[535]

- Arm discs stuck out and cause an obstruction in limited space: RM p10[536], CJ p7[537]

13.3.4.1.3 Upholstery

I tried to pull the cabinet in front of the chair *[by moving the foot stool out of the way]* but then I found there was no room for my legs, so I used the wooden panel on the arm after finding a hard book to rest the pad on, so I didn't have to worry about the cup holder 'dip'. I am writing the diary using the arm panel.' HJ dp2

[532] '*[I found it]* easy to read. In fact it was better for doing cross words on. I either used the arm rest or pulled the thing out and used that.' CJ p6

[533] 'Depending on which side you put your tray. Not your tray… your drawers… a bit higher and lap that over the top. When you pull the drawers in they bang into each other. So I couldn't get them closer. But I'm short, I needed it up closer. But for somebody longer, they would probably be OK.' WM p4

[534] 'Another thing is because they are there, and that's what they are used for, then people automatically use them. So she put her drink down first and then got in the chair. It just moves only a little bit.' WM p5

[535] 'Day One: 3.11.97
Cannot use tray on arms for cup, as I cannot get my arm and shoulder back.' RM dp1

[536] 'But I did have to watch myself, when I got up, that I didn't catch myself on the arms, because there wasn't much room on this side to come past.' RM p10

[537] 'The arm disc, mainly when it was there, 'cos that was the main bit we were walking through… it *[the arm]* stuck out a bit more that the chair.' CJ p7

- More padding: WM p2 & p14[538], DM dp4[539], CJ p2[540], PM dp2 & p5[541]
- Pocket in upholstery for small items: MY p6[542]

- TV remote control: WM p5[543]

13.3.4.1.3.1 Cushions

- Cushions: WD p1[544], CJ dp3[545]

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[538] 'It would have to be more into comfy style, I think. More padding. That's one thing I've written down on the back. More of an arm chair.' WM p2

'The back is hard, Lucy.' WM p2

'Thicker cushions, you know… Recliner, or something that moves back. I don't know whether you would get away with it being more rounded?' WM p14

[539] '…if you could put at the bottom of the chair, a bit more padding. Its even comfortable with more padding I meant to say.' DM dp4

[540] '…I could have done with a cushion under me…' CJ p2

[541] 'Suggestions
Seat needs to be thicker foam and more 'cushioning'.' PM dp2

'…I said that the seat needs to be of a thicker foam, or more cushioning effect because I felt quite numb quite quickly. It felt hard.' PM p5

[542] 'I did feel, I think we discussed it before, I would like, something that I can slot like a little pocket or something, that you could stick a tissue in… Maybe something like the television remote controls, that sort of thing. Possibly the cordless phone. You know, if you're bad... I don tend to have that with me… if you are having a bad day, you don't particularly want to be getting up and down.' MY p6

[543] 'You've definitely go to put something for a TV remote control as well.' WM p5

[544] 'Loose cushions, I had one behind my back… and I also used one on the footrest under my knees… It was more under my thighs rather than my knees' WD p1

- Using cushions: RM dp1[546], CJ p1[547]
- Cushions moved: HJ dp2[548], RM dp1[549], DM dp1[550], PM dp1[551]
- Assistance to move cushions: DM dp3 & dp4[552]

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[545] '[After prototypes had been removed?] *{from diary}*
I found the different cushions useful and moved them around as to how I was feeling.' CJ dp3

[546] 'Day One: 3.11.97
I am using all three cushions for support and comfort.' RM dp1

[547] '...I found I was comfortable with them *[cushions]* that were on, than with that one *[usual triangle cushion]*.' CJ p1

[548] Day Two: 22.10.97
'I've also found with the head pillows that you can set then at the right position, but if you move your head or pick your head up then the cushions do move a little.' HJ dp2

[549] 'Day four: 6.11.97
Found out why chair is not comfortable: the top two cushions have slipped down. Put them up again. Lumbar one stayed put.' RM dp1

[550] 'Day two: 18.11.97
I found changing the pillow unbearable done a lot of moving to get comfortable.' DM dp1

[551] 'Day 2: 12.12.97
...Back ached after about 10 mins or so. Moved cushions around. Bottom became numb soon after. Cushions became a bit of a nuisance, sliding down into wrong position.' PM dp1

[552] '24.11.97
...I still have to have somebody to change the cushion position, because I can't get off the chair...' DM dp3

- Cushions pushed head forward: WM p3[553], CR dp1[554], MY dp4 & dp5[555], DM dp1[556]
- Built-in lumbar cushion better?: WM dp1[557], MY dp7[558]

13.3.4.1.3.2Day blanket

- Day blanket: RM dp1[559], DM dp4[560], CJ p4[561]

'24.11.97
At times ..... manage to get it done but then I get pains, you do need someone to push the chair *[cushions]* up to where you want it positioning.' DM dp4

553 'I've got rid of the cushions. That was pushing my head too far forward. Now, in Chris's case it was the right way.' WM p3

554 'I've taken off the 'back thing' that you rest your head on, because that wasn't very comfortable.' CR dp1

555 Day one, [17.11.97] initial impressions:
'...I then used the small head rest and I found that it was still putting a bit of strain on my neck and my shoulders, so I have to have it down as far as it would possibly go. I also had the back lumbar cushion in place.' MY dp4

'Day two, 18.11.97
...I can get lumbar and thorasic spine OK, then I can't get my neck right and if I try to get my neck right I find that the material is very slippy and I shunt forward and I just find that I can't get comfortable in the chair.' MY dp5

556 'Day one: 17.11.97
I was very restless on upper part of body of my neck. I had to adjust the neck cushion to short cushion.' DM dp1

557 'Day five: 25.10.97
Perhaps the lumbar cushion built-in to the chair would be better.' WM dp1

558 '...if your hands are sore, you need something that's firm and in place. That isn't going to move around all the time.' MY dp7

- Day blanket was light: RM p4[562], MY p5[563]

13.3.4.1.3.3 Removable cover

- Prefer fitted cover/ no washing: WM p14/5[564]

13.3.4.1.3.4Fabric

- Bright colours: MY p11[565], DM dp1, dp3 & p8[566]

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[559] 'Day six: 8.11.97
I like the day blanket.' RM dp1

[560] '...its big and warm and its really ideal to put by the side of the footrest, while you're putting your feet up. And put it over you when you're cold...' DM dp4

[561] '...that *[day blanket]* was a nice touch, and I did use it, more than I thought I would. I've never got one, again I found that I pulled it over me and I was quite pleased with it.' CJ p4

[562] 'It *[the day blanket]* was useful, because it was nice and light, but quite warm. It was better than that 'Snuggy' *[man made fleece wrap-cum-chair cover]*, were you've got loads of it. It was enough to put over my legs with my feet up and it was something that I could handle. It was nice material, it didn't flop.' RM p4

[563] 'But it was light weight. One day my feet were cold, although it was quite big, it is quite easy to handle and I like the material. Say if you have a woollen blanket, being an asthmatic, but I didn't have any asthmatic reactions to that. It was all very good. I was quite impressed with the day blanket, I must admit. Its an idea that I might incorporate into my new house.' MY p5

[564] 'I don't want to touch it, because it hurts my hands to push it back in... I wouldn't want to wash the covers because, to me, that's another job. And I'm not that way inclined.' WM p14/5

[565] '...the red one has sort of grown on me. I like bright colours.' MY p11

[566] 'Day one: 17.11.97
colourful and bright and very modern and up to date.' DM dp1

- Change the covers, change the appearance: WM p8[567], RM p7[568], CJ p5[569], PM p5[570]

- Cream colour impractical: HJ dp4[571], DM dp1[572]

'24.11.97
The colours on the upholstery is absolutely fantastic, its brilliant. It makes you feel better when you go in there with the bright colours.' DM dp3

'You know when you're ill, and you get up and you've got to sit. Your colours on the material, I don't know why, made me colourful, happy not depressed. I don't know whether its psychological. The colour was cheerful, very cheerful ... I did respond to the colour.' DM p3

'I was saying its nice just to sit here and see a bit of colour. It freshens you up a bit. I know its in your own mind but...' DM p8

[567] 'Well, I think the chair would be useful for someone in an office, but you'd change the covers. The same goes, it would be useful to someone in hospital, as well, you'd probably change the cover to suit someone in hospital. The cover that makes it, for the chair. You could put it in the front room if it had the right covering.' WM p8

[568] 'I think its a versatile... you would just have to have different fabrics, 'cos for hospitals. You would have to have the waterproof...' RM p7

[569] 'I think really you could take that chair into any of those *[environments: hospital, day centre, living room , office or conservatory]*. Obviously, different fabrics on it. But where I work, it would fit in there.' CJ p5

[570] 'I thought the colouring would make a difference, probably because the chair upholstery was light coloured and it stood out, probably.' PM p5

[571] 'Day Seven: 27.10.97 *[from tape]*
I'd also like to comment on the fabric of the chair, as well. I do like it. Obviously the colour of the fabric *[cream]* would have to be a little more practical. But the feel of the fabric is nice and overall I feel comfortable with all of it...' HJ dp4

- Red fabric slippy: CR dp3[573], MY dp4 & dp5[574], CJ dp1 & dp3[575]
- Fabric cat-proof: MY dp7 & p5[576]

13.3.4.1.4 Footrest

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[572] 'Day one: 17.11.97
the material for the footrest and chair was too light and not suitable if the person has young children in the family.' DM dp1

'Day two: 18.11.97
The material fabrics beige will get dirty quickly with having young children.' DM dp1

[573] 'I notice that the material of the seat is, if you relax, you slide down on it... right off really.' CR dp3

[574] 'Day one: 17.11.97
...the material was quite slippy, in comparison to what I was used to. That is something you have to get used to.' MY dp4

'Day two, 18.11.97
...I can get lumbar and thorasic spine OK, then I can't get my neck right and if I try to get my neck right I find that the material is very slippy and I shunt forward and I just find that I can't get comfortable in the chair.' MY dp5

[575] 'Day four: 16.12.97
Sat without footrest, kept slipping forwards. ' CJ dp1

'[After prototypes had been removed?] *{from diary}*
If I sat without the footrest I tended to slip forward...' CJ dp3

[576] '...it seems from a wear and tear animal point of view the material is quite durable.' MY dp7

'Three cats have all been over it, been on it, slept on it, chased round it and I can't see that they've done any damage. I noticed the one time Jake had gone to sleep on it there were just a few cat hairs, and I was able to get them off.' MY p5

- Footrest is good: CJ dp1, dp2 & p3[577]

- Sitting with footrest is better than lying on the settee: CJ p3[578], MY p8[579]

- Large footrest is good: DM dp5[580]

- Raised footrest to reduce inflammation: HJ dp4 & dp5[581], DM dp5[582]

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[577] 'Day one: 13.12.97 *{from diary}*
Nice to have leg rest.' CJ dp1

'[After prototypes had been removed?] *{from diary}*
I really miss the footrest.' CJ dp2

'I thought the footrest was very nicely done. It was a nice shape, that was. Its the best one I've seen. Normally they just aren't right. Even in the hospitals and everywhere where I've used them, there's always something that just don't seem right. But that one whether it was just how it matched the chair, I don't know, or whether… it seemed to be on a bit of a tilt some how. You could tell if you hadn't got it right, if you'd got it the wrong way.' CJp3

[578] 'I found the leg rest very comfortable, that was a lot better than trying to lie on here *[settee]*.' CJ p3

[579] 'In the right size I could imagine that I would use it every day. If it was made to fit me. I think the theory of it, rather than how I lie on the settee at the moment and twist my neck, the theory of it is very good for the neck. In the end it would be better for my joints and I aspire to have a chair that will suit me, I do.' MY p8

[580] 'Its spacious, and its got loads of leg-room to put your legs on the footrest, lots' DM dp5

'The shape of the footrest was big *[sic]* and spacious. Normally, every footrest I had was small. You can only get your two legs on, you're scared… *[they might fall off?]* I've been in hospital and come out, and one of them *[children]* are knocking you… It might be psychological, but with yours I could be comfortable, because it was wide, length wise as well.' DM p5

- Footrest difficult to move: PM dp1& dp2[583]

- Footrest got in the way: PM p9[584]

- Footrest difficult to adjust: PM dp1 & dp2[585]

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[581] 'Day six: 26.10.97 *[from tape]*
...I've spent either time sitting on the normal settee with the footstool so that my legs have been slightly raised because I've had problems with inflammation of the knees.' HJ dp4

'Day ten: 30.10.97 *[from tape]*
The footstool I think is great. Even if I have a bad day, I've found I can sit on the settee using the footstool so that with my legs are elevated, so I really do like to use that.' HJ dp5

[582] 'When you want to rest your leg and its not well and you want to rest it up high, you can just put the footrest up high and its ideal' coming out of hospital, and there's no messing about.' DM dp5

[583] 'Day One: 11.12.97
Difficult for me with a back problem to move stool around...' PM dp1

'Day 5: 15.12.97
Difficult to move foot stool into position because it hurt my back to do so.' PM dp2

[584] '...Apart from the footstool, which got in the way a bit. I couldn't adjust it properly, very easily... I had to fiddle with the footstool and sometimes that made my back ache ... sometimes I pushed it out of the way and then it would be over there then the next time I wanted it, it was over there and I would think 'Oh, god' and go and get it again. I needed it on a piece of elastic.' PM p9

[585] 'Day 3: 13.12.97
Found it difficult to adjust height of stool, couldn't do it alone.' PM dp1

'Day 5: 15.12.97
Difficult to adjust height of chair and stool because my wrist is painful today.' PM dp2

- Footrest with storage: CR dp1[586]

- Footrest for reading paper: HJ dp3[587]

- Chair with footrest: WM p5 & p6[588]

13.3.4.1.4.1 Chair & footrest base

- Different base for the chair & footrest: PM p5[589]

- Hidden or exposed feet: WD p8[590], CJ p7 & p8[591]

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[586] 'The footstool would also *[be useful]* to be used for storage if it had a hinged lid.' CR dp1

[587] 'Day five 25.10.97 *[from tape]*
...I've used the footstool for reading the paper: by putting the paper on the footstool.' HJ dp3

[588] 'I can't use it *[the chair]* without the footrest, Lucy. Its too high.' WM p5

'The chair is just too high, Lucy. I means my feet dangle... Its uncomfy *[sic]* like that to me.' WM p5

LP: If you had your feet on the footrest. How was that?
'Brilliant. That was the best way I used it, the only way I've used it.' WM p6

LP: From your experience of using that, would you use a footrest with your chairs now?
'Well, I use my recliner now.' WM p6

[589] 'Also, how could I describe it, just having that configuration of legs sticking out, didn't seem to go with the top half of the chair. I felt that there should be another shape underneath.' PM p5

[590] 'I prefer it hidden. I think for a living room, if you were having it in an office it would be more appropriate. But I did like the idea that it was all hidden, and the footstool. Its more aesthetically pleasing.'

- Legs look 'officey': HJ p9[592]

- Timber on legs: HJ dp5[593]

- Bungs came out: DM dp3[594]

13.3.4.1.5 Cabinet

- Cabinet: DM dp4[595], CJ dp2[596], PM dp3[597]

'I quite like the exposed feet'. WD p8

[591] '...With the cover over it, you just tended to think it was a solid chair. You know what I mean, as opposed to sticking out. I know with having a chair with no cover on, the computer ones, I trip over them quite a lot. They stick out more than the chair but having that cover, especially on the footrest, it seemed as though it was a solid thing as opposed.... apart from the cat would go under it and pounce out and grab your leg *[laughs]* He'll miss it.' CJ p7

'...I prefer the covered up base on that one *[red prototype]*' CJ p8

[592] 'It also makes it look more like lounge furniture, you've covered up the legs on the chair, which is a bit 'officey'.' HJ p9

[593] 'Day ten: 30.10.97 *[from tape]*
It would be nice to have the legs on the footstool and the chair in a wood feature or a wood-effect, so that it would blend in a little bit more with the lounge surroundings...' HJ dp5

[594] '24.11.97
...those things *[bungs]* that on the bottom of the chair, that keep coming off they are a nuisance, trying to get them back on. Its a very bad problem. You can go flying on them as well, trip over them when they come off.' DM dp3

[595] '24.11.97
Its a very good cabinet, because its spacious.' DM dp4

- Crutch storage: HJ dp3 & dp6[598], DM dp1 & p3[599], WD p5[600]

- Need demonstrated for stick/crutch storage: RM p10[601], DM dp3[602]

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[596] '[After prototypes had been removed?] *{from diary}*
I miss the table unit and I am thinking of purchasing a small chest of draws [sic], as it was handy to have things to hand yet stored away neatly. But these will not be on castors nor have extendible tray, which was very useful. I used that for writing and meals. ' CJ dp2

[597] 'I found the cabinet very useful!' PM dp3

[598] 'Day four: 24.10.97
I'm using the little pockets on the cabinet to put my crutches in, which is great. I like that.' HJ dp3

'After removal of furniture *{from diary}*
I haven't now got a 'place' to put my crutches and they are falling on the floor, etc.' HJ dp6

[599] 'Day two: 18.11.97
When I stood up and tried to put my stick down to rest in the cabinet.' DM dp1

'When I used my stick, putting my stick into the hole, I couldn't do it.' DM p3

[600] 'It *[stick storage in the cabinet]* would be handy with the things for crutches, you know. Because you never know where to put them, they're always falling down.' WD p5

[601] Kept everything in one place: '...I just used to lose my sticks. I used to get really annoyed. I put my sticks here, I quite often do. You'll see they go to there, *[on own chair]* and I can sit there all day. But with yours *[prototype chair]*, it slanted down the back so they fall through the slot and then I would have to get my grabber. That used to annoy me.' RM p10
[User did not have space to try cabinet.]

[602] '24.11.97
I still can't put my stick inside. I can't reach that far up.' DM dp3

- Cabinet assists carer: DM p5[603]

- Cabinet needs lockable section for drugs: DM p5[604]

- Cabinet looks solid: CR p4[605]

- Cabinet is sturdy: DM dp3[606]

- Cabinet moves easily: CR dp3[607]

- Cabinet does not move easily: DM dp1[608]

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[603] 'She *[carer]* said its ideal for when you come out of hospital. She said you've got enough space to put all of your stuff in that little cabinet. You know, when you come out of hospital, the first thing you do, you slog all your stuff that you've had in hospital, that you need, in one place somewhere... we could put it all in there and when you are better, you can get it yourself then, and we wouldn't get moaned at then. They have to help me.' DM p5

[604] 'One of them said, if you had a little locker, it would be ideal to put everything in one place. You know, you can't put your tablets there, he'll get them *[her son?]*.' DM p5

[605] 'Well the cabinet, I think it would look really terrific... Instead of wood, in light weight steel or... With my marketing head on, it does look solid.' CR p4

[606] 'I like the cabinet as well because you could put heavy things on there without the cabinet wobbling or breaking.' DM dp3

[607] 'Its Tuesday the 4th: (12.97) I still like sitting in this chair, having the cabinet handy, which moves without any difficulty...' CR dp3

[608] 'Day one: 17.11.97
Putting the chair and footrest and cabinet in the right position was very hard.' DM dp1

'Day one: 17.11.97
found it all too heavy for their mother to move it all about in the different rooms on her own.' DM dp1

- Drink on cabinet: WM p5[609], PM dp1[610]

- Used cabinet drawers: WM p6[611], HJ dp1[612], CJ dp1[613]

- Close to hand: HJ dp6[614], DM p2[615], CJ dp2[616]

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[609] 'I think it would be better if you could have the drawers nearer... then you could pick your drink up and bring it over.' WM p5

[610] 'Day One: 11.12.97
Coffee unsteady on the arm rest, transferred to cabinet.' PM dp1

[611] 'I put your cushions in the bottom drawer and then book and things that I'd been using as the week went by.' WM p6

[612] Day one: 21.10.97
'I like the ideas of the drawers. In fact, I've put books and a few little items in the top drawer...' HJ dp1

[613] 'Day two: 14.12.97
Found the table/ drawers very useful.' CJ dp1

' ...they [*drawers*] were very easy to open.' CJ p1

[614] 'After Removal of Furniture *(from diary)*
I missed using the chair and cabinet as I had got use to sitting and writing or reading having all my 'items' to hand... I now find myself getting up more often as I have my magazines/ papers etc. in all sorts of place!' HJ dp6

[615] '...but it was ideal for me, to keep it in one place. I got on the phone and I didn't have to faff about with the paper. It stayed in one place.' DM p2

[616] '[After prototypes had been removed?] *(from diary)*
Will miss the table unit. It kept things close to hand, but a the same time neat.' CJ dp2

- Cabinet as workstation: DM p2[617] HJ dp4[618], PM dp1[619]
- Pull out surface, for writing & reading: WM p6[620], HJ dp4[621]
- Pull out surface too far away: WM p4[622]
- Cabinet too heavy to pull close: WM p6[623]
- Cabinet too far away: WM p4[624]

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[617] 'What was really handy was, you know like I've got all of these bills and that. When I had the drawers and the pull out one, 'cos I had the phone there as well, I had the same paper that I needed for that day. Instead of moving about and going to look for it...' DM p2

[618] 'Day Seven: 27.10.97 *[from tape]*
I've been writing some letters this morning. I certainly feel a lot better today. I'm using the top of the cabinet. I'm keeping all my writing implements: pads, notes and books in the drawers and I do like the space that the cabinet gives me and I'm almost turning it into my little workstation.' HJ dp4

[619] 'Day 3: 13.12.97
I could have done with a larger table area to eat off and use as a work surface.' PM dp1

[620] 'I thought it would be useful for writing, but I've not used it at all.' WM p6

[621] 'Day eight: 28.10.97 *[from tape]*
I'm trying the little pull-out section of the cabinet and I've been reading magazines resting on that...' HJ dp4

[622] 'The drinks thing is a good idea, really a good idea, I like that but when you've got the other one *[pull out surface]* you couldn't get it near enough.' WM p4

[623] 'Just the fact that pulling: if you wanted to use the tray, it was heavy to pull in. To me I needed it nearer. And the drinks tray stopped it. I think that stopped me using the drawers more that I would have done normally.' WM p6

- Indifferent to cabinet: CR p1[625]

13.3.4.1.6 Pricing & selling the furniture

Initials	Chair	Footrest	Cabinet	Day Blanket	Cushions
RM	£200-300	£50	£50	£20	£25
HJ	£500	£80-90	£100	£15-20	£15-20
CR	£100	£70	£80	£10	£8
MY	£400	£150	£150	£40-50	£25-30
DM	£500	£100	£200	£40	£40
WD	£400	-	-	-	-
CJ	£200	£100	£150	£20-25	£20
PM	£250	£100	£150	£15	£25

- The furniture should be sold in the most convenient way, with little time and effort. Sold in local, easily visited outlets or by mail order, QVC shopping channel, word of mouth etc.: MY p[626], DM p7[627], CJ p5[628]

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[624] 'When you pull the drawers in they bang into each other. So I couldn't get them closer. But I'm short, I needed it up closer. But for somebody longer, they would probably be OK.' WM p4

[625] '... it *[the cabinet]* didn't sort of fit into my system.' CR p1

[626] 'I would hope that mainstream people would start to sell things... I don't see why disabled people should have to...*[travel]*. For example, I had to go over to Merry Hill to Keep Able. That's a heck of a drive out... Not everyone's got a car, not everyone can get to these places.' MY p

[627] 'I'd say mail order. You could look at different catalogues. When people can't get out that's my opinion with being disabled... But not to trawl the furniture shops... With a bulky wheel chair and by the time I've go the kids moaning and that, its not worth really to go out... on the television, and on cable and that... QVC the shopping channel. Or word or mouth really, but there are not many people, disabled, dealing through Arthritis Care, maybe through the hospital?' DM p7

13.3.4.1.7 To be 'normal'

- Participants wished to be as 'normal' as possible: WM p1 & 2[629], HJ p9[630], DM p6[631]

- Remove unusual features from the chair, i.e. the arm discs, when expecting visitors: MY p3[632]

13.3.4.1.8 Aesthetics

- Could 'look' more comfortable: WM p2 & p13/4[633]

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[628] 'Mail order I think and perhaps where I got my Nan's chair where they sell mobility stuff, I don't know what they call them, you can go there and get different aids, can't you.' CJ p5

[629] '...you're above your furniture, and when you're are like I am now, going through a pretty good phase, you don't want to feel high, because I can sit on my normal chair.' WM p1

'When you're having a good phase, you kid yourself along, you probably don't realise it, that you feel pretty normal.' WM p2

[630] I think that its important that it matches with everything else and doesn't stand out as being different.' HJ p9

[631] 'I would not throw it out. When I wasn't using it I'd put it in the study.' DM p6

[632] '...what kept catching my eye were the arm rests. Because they are so unusual, I kept finding myself, every time I looked at it, especially coming down stairs you see it. I think with it being such light wood. I felt if I was asking for that chair to be made, I would like those to be removable. Say, if you were having visitors.' MY p3

[633] 'It would have to be more into comfy style, I think. More padding. That's one thing I've written down on the back. More of an arm chair.' WM p2

'...if you're going to make it for a home then its got to be more luxurious... Thicker cushions, you know... Recliner, or something that moves back. I don't know whether you

- Different 'make up' could look different: WM p9[634], HJ p9[635], MY p11[636], CJ p3 & p5[637]

- Looks like hospital chairs: WM p8[638], RM p9[639], DM p8[640], CJ p3[641]

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would get away with it being more rounded?... The arms are a bit more rounded, aren't they, the back was like an office type.' WM p13/4

'Thicker cushions, you know... Recliner, or something that moves back. I don't know whether you would get away with it being more rounded?' WM p14

634 '...its 'make-up' again. You could cover the wheels on that if you put timber down to the bottom.' WM p9

635 '...if someone had got a lot of dark furniture, it would be nice to offer it in perhaps a light or a dark colour.' HJ p9

636 'If you had a choice of choosing a finish for the timber, would you rather go for a darker stain? # Probably, because all of our furniture is oak.' MY p11

637 '...but after a bit and I suppose if you had your decor to match it, it would tone in more.' CJ p3

'I think perhaps a darker wood, because hospital colours are usually that pale colour. So that probably associated that in my mind with that...' CJ p3

'You could use it *[the cabinet]* in a living room perhaps different wood, you'd have it to tone in with what you'd got, wouldn't you.' CJ p5

638 'I don't mean to criticise but they are like a bit like hospital chairs aren't they. And I think initially that does make you feel uncomfortable, the visual thing. And of course you get comfy with the idea.' WM p8

639 'It *[the prototype]* didn't look like a hospital chair. I'm dead against these things that look like hospital furniture. I didn't look like that type of institutional...' RM p9

640 'Old fashioned, or not bright enough or... or depressing ...These big, bloody, clompy chairs they get you into... You have to sit in this chair that I sat in when I was twelve. 'Cos, I've been in and out of hospital, you've go the same chair. You want to get

- Looks like a hospital/bedside cabinet: WM p9[642], DM dp4[643], CJ dp2, p3 & p5[644]

- Doesn't appeal to younger people: WM p10[645]

- Unconcerned by aesthetics: needs to be practical: RM p4 & p15[646], DK p2 Questionnaire[647], CJ dp2[648]

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happy and you can't because its all the same. You need bright, but its got to have the money and the budget...' DM p8

641 'At first, it seemed a bit hospital-ish, do you know what I mean... It seemed like you were sitting in a hospital chair with a hospital cabinet by the side of you...' CJ p3

642 'I think that's what it is, its like those *[cabinets]* that you get near your bed in hospital.' WM p9

643 '24.11.97
I think the cabinet looks like a hospital one sometimes...' DM dp4

644 '[After prototypes had been removed?] *{from diary}*
I felt that the design was a bit too much l like a hospital locker/nursing home style, to fit into a normal home setting and not look out of place.' CJ dp2

'At first, it seemed a bit hospital-ish, do you know what I mean... It seemed like you were sitting in a hospital chair with a hospital cabinet by the side of you...' CJ p3

'It *[the cabinet]* seemed like a hospital cabinet to me at first, 'til I got used to it. But after a bit I just got used to it and I used it as a table as I would any other side table.' CJp5

645 'She *[WM's daughter]* doesn't like it. That's why I said to you *[not for younger people]*.' WM p10

'We've all sat in it but they've *[WM's children]* said this isn't for us. So I was thinking, maybe not for younger people *[sic]* are not going to like it.' WM p10

- Doesn't look clinical: RM p9[649], PM p8[650]

- Medical aesthetic is...: RM p9[651], MY p7[652], CJ p3[653], PM p8[654]

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[646] 'I'm a practical person: anything that's comfortable. *[laughs]* I'm past caring as long as it suits my needs. That's all that matters, rather than whether it fits in the room, or whatever.' RM p4

'I like the darker colours, because of being practical. I like floral ones or something like this one. *[plain British racing green Dobby weave]*... To look at, that cream one is nice to look at, but that one is more me for being practical... the darker colour... It depends what, I mean some young people might like the cream one, for looks. Because it looks more trendy, officey, up-and-go... Its not all disabled people who want practical things.' RM p15

[647] Received by friends and family as 'ugly but practical' DK p2 Questionnaire

[648] '[After prototypes had been removed?] *{from diary}*
Most homes with a disabled/ elderly person in have to have adaptations and aids not found in other homes but the usefulness usually outweighs the cosmetics.' CJ dp2

[649] 'It *[the prototype]* didn't look like a hospital chair. I'm dead against these things that look like hospital furniture. I didn't look like that type of institutional...' RM p9

'I think its more homely than clinical.' RM p9

[650] 'I think its *[prototype furniture]* quite elegant and doesn't clash with other furniture that I've got.' PM p8

[651] 'I think its the PVC that does it. I mean this one was in PVC and to me it always looked like an old people's home. It gave that impression. Put it in fabric and every one said they didn't realise it was the same chair. I used to keep it covered when it was PVC, apart from the arms.' RM p9

[652] '...vinyl in case people are incontinent, you can wipe them down... Usually brown. Wards of brown chairs.' MY p7

13.3.4.1.9 Arthritis

- Arthritis fluctuated during testing period: MY p2[655], DM p4[656]

- Higher chair would be useful during a 'flare-up' of arthritis: WM p1 & 2[657]

- Furniture considered good for post-operative recovery: DM dp5[658]
- Amount of time since diagnosis of arthritis significantly affects user's frame of mind: MY[659]

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[653] '... hospital colours are usually that pale colour. So that probably associated that in my mind with that...' CJ p3

[654] 'Yes, it [a clinical or medical aesthetic] would look completely functional. The design wouldn't be elegant in anyway. It wouldn't be functional and probably covered in plastic. *[laughs]*' PM p8

[655] '...some days different bits hurt, more than others.' MY p2

[656] '...you just don't now yourself. Every day is different. you just don't now yourself. Every day is different.' DM p4

[657] 'I would have thought, for someone who was in a really bad flare-up and couldn't move this would be the absolutely idea height for everything.' WM p1

'I definitely think if you really are ill, or stiff or if you need your knee or hip doing. That would be the sort of height you'd want.' WM p2

[658] 'I'm in a lot of pain when I've had an operation and you don't want no one to mess you about, lift up and down. It saves having pillows and a piece of wood under your couch and this is ideal...' DM dp5

[659] '...say, if I was newly diagnosed or going through not accepting the RA, if I was trying it the *[prototype which was too big]* then, I might think: 'God this is just another frustration', or 'Why me'? But I think, having R.A. for so many years... you just accept whatever it throws at you. I could image, lets say, eight or nine years ago, I would think this is just another failure.' MY

- Participant felt to be considered 'less able' because of being asked to try furniture which was designed especially for a person with a condition: CR dp1[660]

13.3.4.1.10 Comfort

- An ideal would be for the prototypes to assist in minimising pain: MY p8[661], DM dp5 & p4[662]

13.3.4.1.11 Sleep

- Need wings to fall asleep: WM p3 & p10[663]

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[660] '...I haven't considered myself in this way... Compared with some people with disability, I am able to get around a lot so I don't tend to sit with things at my... within easy access... and in a way this will affect my mind set in that it needs some more planning. Its kind of like work station planning. I like to sit when I work, the way Lucy's discussion of my needs, when she called on Friday, seemed to indicate that she expected the chair to be used for leisure. I will try and use it for that as well. I will also try and use it for work in addition and I will also try and have meals with it or by it.' CR dp1

[661] '... to be able to just sit in it and not feel gosh my neck, or gosh this hurts, gosh that hurts. To be able to sit in it and not think really. To be comfortable is not being aware, or to minimise... I know you can't always get rid of the pain or the stiffness but to minimise it.' MY p8

[662] 'I'm still in pain whatever position I sit, whatever chair I sit in.' DM dp5
'...I can't relax. Its just the way you are, you can't relax because of the pain. I'd love to.' DM p4

[663] 'My idea of using the wings was so you actually fall asleep. But they seemed to be too far out they needed to be more...' WM p3

'I wouldn't have felt comfortable enough to sleep in it. Because you needed something to stop your head falling, and that didn't fit in with that.' WM p10

'I wanted to feel secure, a safety feeling or something... But I didn't feel safe. I think that's why I'd have more padding and wings.' WM p10

- Not comfortable enough to sleep: WM p10 &12[664], HJ dp2-3 & dp4[665]

- Back to recline in order to sleep: HJ dp2[666], WD dp1[667]

13.3.4.1.12 Familiarity

- Unfamiliarity of furniture: WM p7 & p8[668], CJ p2 & p5[669]

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[664] 'I wouldn't have felt comfortable enough to sleep in it. Because you needed something to stop your head falling, and that didn't fit in with that.' WM p10

'I wanted to feel secure, a safety feeling or something... But I didn't feel safe. I think that's why I'd have more padding and wings.' WM p10

'Sleeping is very high on the agenda with somebody with RA, I'll tell you that now, Lucy. 'Cos yesterday, I thought I'd love to go to sleep, but then I thought I can't go to sleep in this chair. I did go to bed.' WM p10

'Sleeping habits? No. It hasn't fitted-in in that way at all.' WM p12

[665] 'Day four: 24.10.97
I can get comfortable with my feet on the stool. Not quite enough yet to go to sleep, but it was quite a restful position.' HJ dp2-3

'Day six: 26.10.97 *[from tape]*
I've found it difficult to actually sleep and I feel I need to do that today.' HJ dp4

[666] Day two: 22.10.97
'I've found it almost impossible to be able to lie back enough to sleep.' HJ dp2

[667] Day one: 5.12.97
'I normally sleep during the day in my reclining armchair. I couldn't get comfy enough in this chair to sleep as it is too upright, so I went to bed instead.' WD dp1

[668] 'I did feel a bit awkward to start off with. I didn't feel part of the room.' WM p7

'I felt like I was above everybody. Regal's the word, not elegant. But you do get used to it. I remember thinking, I'm not going to get used to this. But the more you use it, its a

- Familiarity with chair/ furniture: WM dp1 & dp2[670], HJ dp3 & dp4[671], CR dp3[672]

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visual thing, isn't it really. Initially you think, I don't think I'm going to like that in the corner, but its become part of the furniture. Its acceptable now. So whether you should do a longer trial?' WM p7

.'Yes, you do get used to it. But initially you try to find the comfort. It becomes like an obsession, when you've sat in it for so many days I got quite used to it. All the things you thought were odd about it at the beginning, or you weren't quite sure about, you got used to it.' WM p7

[Experience of comfort with the furniture] 'Comfortable, but you had to get used to it.' WM p7

'I don't mean to criticise but they are like a bit like hospital chairs aren't they. And I think initially that does make you feel uncomfortable, the visual thing. And of course you get comfy with the idea.' WM p8

[669] 'At first I felt... awkward but then as time went on I felt all right with it...' CJ p2

'It *[the cabinet]* seemed like a hospital cabinet to me at first, 'til I got used to it. But after a bit I just got used to it and I used it as a table as I would any other side table.' CJp5

[670] 'Day 3: 23.10.98
Well, the chair is becoming part of the furniture.' WM dp1

'Day seven: 27.10.97
I am getting used to the chair. Haven't used the throw over yet! I don't know whether the test period is going to be long enough - Because the chair is becoming part of the furniture and I tend to want to sit on it now. As at the start it didn't seem to comfy.' WM dp2

[671] 'Day four: 24.10.97
So I do feel today that I feel a lot more comfortable with the whole idea really...
as I say I feel a lot more comfortable with the chair today.' HJ dp3

'Day five 25.10.97 *[from tape]*

- Preference for furniture in a certain place in a room: WM p7, p10 & p14[673]

- Thermal comfort: RM p14[674]

13.3.4.1.13 Accidents

- Tripped on chair legs: WM p12 & p13[675]

- Tripped on bungs: DM p3[676]

I find once again that I'm getting more and more used to the chair and I feel a lot more comfortable with it.' HJ dp3

'Day five 25.10.97 *[from tape]*
... its definitely becoming more of an every day... very much becoming part of the furniture in the lounge...' HJ dp3

'Day eight: 28.10.97 *[from tape]*
I'm finding I'm using the chair more and more.' HJ dp4

[672] 'Wednesday the 6th: I find it a very calming chair to sit down in. It's become accepted, feature in the place.' CR dp3

[673] 'Initially you think, I don't think I'm going to like that in the corner, but its become part of the furniture.' WM p7

'Everyone likes that position *[in the room]*' WM p10

'You just like certain things in a certain spot.' WM p14

[674] 'It was just nice to sit in my own chair, because it was cold in that corner.' RM p14

[675] 'I caught my feet on them. I don't know whether you've covered it that way, you're not looking. I suppose if you saw the leg, I don't really want to see the legs, you'd be aware of it, but the cover just covered the legs and you. It must be, the leg and there down there almost, I caught my foot.' WM p12

'Coming to think about it, that's twice I caught my feet on that.' WM p13

- Could not trip over chair legs: WM p13[677]

- Drinks can spill whilst on the arm disc: WM p5[678], HJ dp1[679], MY dp4 & p10[680], PM p10[681]

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[676] '...those bung things. I wouldn't have those things that fall out, they were terrible. That's the dislike. I fell on one of them, you know when you walk... It didn't half hurt.' DM p3

[677] 'I didn't notice that with the chair, but you protected yourself by the arms. They pushes you out further. Its psychological really.' WM p13

[678] 'I have had an accident, but it wasn't me that did it... *[laughter]* And luckily it only went in that tray.' WM p5

'...she put her drink down...she went like this to pull herself back, and she's a very tall woman, and of course she moved a fraction and the drink went. Not everywhere, just in the drip tray.' WM p5

'Another thing is because they are there, and that's what they are used for, then people automatically use them. So she put her drink down first and then got in the chair. It just moves only a little bit.' WM p5

[679] 'Day one: 21.10.97
'...I've found having a cup of tea, if I place it on the little side wooden piece on the chair in the area designated for that, I feel as if I'm going to knock it off with my elbow. In fact, I did spill a drink because as I actually turned to do something, the chair moved causing the drink to spill.' HJ dp1

[680] 'Day one: 17.11.97
I noticed with the chair wobbling that the tea did slop around a bit.' MY dp4

'On the first day, I found that wobble *[sideways movement of the chair, because of the gas stem]* I spilt a bit of tea.' MY p10

[681] 'The only accident we had was if there I'd got a drink in the arm thing, that got knocked quite a lot, either by me or the kids going past. But I think the chair moved fairly easily, so I stopped putting drinks in it.' PM p10

- Chair's sideways movement: HJ dp3[682] PM dp1[683]

[682] 'Day five 25.10.97 *[from tape]*
I do find though, with the chair moving just a little bit side to side this can cause a few problems: if you've got a drink, as I said earlier you could spill it, so I think it would be a good idea just to make sure that the chair doesn't actually move.' HJ dp3

[683] 'Day One: 11.12.97
Coffee unsteady on the arm rest *[because of sideways movement]*, transferred to cabinet.' PM dp1

13.3.5 Footnoted highlights from ergonomist Professor Mark Porter's critical observations of the prototypes

13.3.5.1.1 Dynamic seating

- Adjustable seat - tilting & swivelling but locking: MP p17 & p8[684]

- Swivel option an advantage: MP p3-4[685]

- Need to recline: MP p11[686]

- Some tasks are forward leaning and others backward leaning: MP p11[687]

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[684] '...the swivel which is realisable, I'm keen on, I personally would like to recline it. I think the change of pressure distribution would make it easier to sleep in it and everything else. Of course, it needs to lock into an upright position when you get in and out.' MP p17

'...I think both of those *[Swivel & tilt]* would be ever so nice. That would be a major plus-point. It would be much more attractive to the end-user.' MP p8

[685] 'So why non-swivel? ...Actually its quite important that you can swivel ...The swivel could be useful if you've got aches or pains: I'm sitting here and I'm doing this *[working on the pull out surface]* and when I want get up its much easier if I just swivel, spin it sideways and get on to my bed. Otherwise I've got to move that, get up and go this way, so I can see that you've got rid of the swivel for stability, getting in and getting out, but actually you've lost a bit of functionality that could be quite useful. Even, there's my friend, there's the TV, you know I want to be in different position, I want to sit facing... And even me, and I've got fairly healthy joints... If I sit watching the TV for a remarkably short time with my neck twisted then you get all sorts of muscular cramps and everything else. I would of thought that by having some sort of override on that tilt, so you could directly face the TV or a friend, look out the window, or to get on to your bed...' MP p3-4

[686] '...I would want to recline, to tilt back, quite soon.' MP p11

- Avoid postural fixity: MP p10 & p22[688]

- Constrained posture: MP p22[689]

- Encourage mobility with dynamic seating: MP p4[690]

- Postural fixity leads to pressure build up: MP p5[691]

- Dynamic seating distributes pressure: MP p5[692]

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[687] '...eating its essentially its a forward leaning task.... When you are writing its forward leaning unless you can tilt it quite nicely, and then when you are watching TV, on the phone, or sleeping then you want to move a way backwards...' MP p11

[688] '...what is coming through from the ergonomics literature is that there is not a perfect posture. We do a variety of tasks, so the last thing we want is to be fixed in one position.' MP p10

'...postural fixity in a perfect posture is still a problem.' MP p22

[689] '...Then you have something called a constrained posture... in addition to being fixed in one posture, your posture is constrained. E.g. So you've got glare from there, the lights there so you hold your book this way, and the TV is slightly off, and the footstool is over here. So its forcing, not a fixed posture, but not a desirable posture.' MP p22

[690] '...I know people with arthritis have difficulty with being mobile, but probably the solution isn't to fix them in one posture it probably to keep them and encourage them to be mobile, as long as possible, or as a balance between the two.' MP p4

[691] 'One of the problems you've got is postural fixity... healthy people driving cars, and four hours a day in a van and you've got big problems... they've got postural fixity by being stuck here and then you get high pressure points where you've got to get rid of your body weight... It stands to reason if its in one place constantly then its going to stop the blood getting to the tissues, and stops the oxygen getting to the tissues and lactic acid getting away' MP p5

- Adjustable cushions promote different postures: MP p10[693]

13.3.5.1.2 Arms

- Prefer arms to be upholstered: MP p6, p9 & p20[694]

- Arm discs a hazard: MP p6 & p8[695]

- Swivelling, moveable surface: MP p9-10 & p20[696]

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[692] '…one way to change the pressure distribution is to tilt the seat forwards and backwards.' MP p5

[693] '…in this context, you want to be able to adapt as many postures as possible. So I actually quite like the idea that its *[the cushion]* separate. Because it means that people can adjust it, and use it sometimes and not others.' MP p10

[694] 'Arm rests need to be soft around here *[elbow]*… over a long period of time you've got an obvious pressure gradient here *[Between the arm rest and the discs at the end of the arm]*' MP p6

'…I am also worried about this pressure *[under the wrist, where the arms disc sits above the upholstery]*.' MP p9

'…If you didn't have a use for them then I'd much rather have the upholstery.' MP p20

[695] '…I would have accidents with this. If you put anything there, I would knock it over every single time and I'm not accident prone in the slightest. So I would never put anything there, I would have a hot drink there *[on the cabinet top]* and I would bring that over to me. I can't see why that's there. Particularly if you make the seat tiltable and more dynamic… I think its a bad place to put it, personally.' MP p6

'…you're going to get in and out, and if you do fall asleep, or, you just shouldn't encourage people to put hot cups of tea, that close to them…' MP p8

- Front pull-out surface could obstruct access into drawers: MP p6[697]

13.3.5.1.3 Footrest

- Leg support: MP p9[698]

- Additions to the chair - chitty-chitty-bang-bang?: MP p10[699]

- Testing sitting position over a period of time: MP p11[700]

- Designing for many different people: MP p15[701]

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[696] '...You could virtually do with something that is another accessory that pulls out from here that comes across, and allows them to write. What about a tray? Has a tray been designed, to go with it?' MP p9-10

'...if you did want to stay with this *[design for the arms]* for whatever function it performs, it would be quite nice to have them *[arm discs]* easily removable.' MP p20

[697] 'if I want to get something out of the drawer... That stops me getting in the drawer... it actually gets in the way. Perhaps if the things come out to the sides, for thing to put coffee cups on.' MP p6

[698] '...I wouldn't stay in one place... It is quite nice with a tilt on you could have it either way or sideways. We don't actually need much support round here *[under the knee joints]*, particularly if you are seated normally, you want to avoid pressure under the popliteal thoroser you've go the nerve and the artery and the vein.' MP p9

[699] '...stick on different bits, that go away in a special drawer... you may want a tray or a writing surface, but still want the possibility of quickly put it up and get it out of the way again, rather than have to dismantle it entirely.' MP p10

[700] 'In all the work I've done on seating, we get people to sit in car seats and drive cars for two and a half hours, 'cos they'll often tell you, this is how I feel, but I don't, know how I'll feel two or three hours down the line.' MP p11

- Larger the market group, the lower the cost: MP p16[702]

- Posture analysis to evaluate design of chair: MP p21[703]

- Reasons for discomfort: MP p22[704]

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[701] '...Where ever you fine tune it *[a design]*, in one area, just think of the people who you design out, and if that, on balance, is the best decision.' MP p15

[702] '...I'm sure a manufacturer would want it *[the chair design]* to work for as many people as possible, you don't want to reduce your sales. You could be doing a service even to the niche group you're talking about, because the greater volume of chairs being sold the lower the costs will be and the more generally available they'd be.' MP p16

[703] '...So you might find that the shoulder's hurting and it could be the armrest that is too high. My neck is hurting, it *[the chair]* doesn't swivel. You have to tie it in with a postural analysis so maybe you would come back and see where it was set and ask them to look at the TV, take a picture...' MP p21

[704] 'Of course, there are other reasons, apart from arthritis, why you have discomfort and pain, there's cold draughts, there's tensions. It could be that the TV' slightly off. They are sat slightly skew-whiff in the chair. The chair can be fine but...' MP p22

14 SECTION FOUR - Project evaluations & conclusions

14.1 Introduction to SECTION FOUR

The first part of this section is made up of case study conclusions which specifically evaluate design features of the prototypes and then the testing process. The thesis ends with conclusions for the overall project, design and disability in general.

Recommendations for future work can be found in the **Appendices**, volume 2, section 13, **Project overview - culmination of knowledge**

14.2 Findings & conclusions of prototype design

14.2.1 Chair

14.2.1.1 Seat height

The prototype seats were considered too high for general use because of the addition of casters and the height of the gas stem. This meant that to achieve the ideal height a shorter than 'standard' gas stem was required. However, because the gas stem was non-swivelling and 'non-standard' and owing to the small quantities needed, in the time available the manufacturer could only supply a longer than ideal gas stem. The disadvantages were that, the seat was higher than intended, consequently:

- several participants could only use the chair with the footrest
- another participant could not rise from the seat unaided
- the height adjustable nature of the chair was not fully explored
- some participants felt uneasy positioned higher than others sitting with them in the room.

The advantage was that three people found that they could sit and rise could more easily.

The height of the chair is relative to the stature of the individual rather than being generically 'high' because the user has arthritis.

14.2.1.2 Gas stem

The gas stem had too much 'play' in the mechanism allowing the chairs to sway slightly from side to side. This was unforeseen and undesirable as it questioned the solidity of the chair.

The seat was not intended to swivel but several of the participants and their family expected that it should.

14.2.1.3 Casters

Although casters were added to the furniture to make it easier to manoeuvre during delivery to people's homes, they were not intended for the user to 'travel' on them. One participant experimented with this and would have preferred more freedom to 'scoot'.

14.2.1.4 Tall back

The tall back was an appreciated feature.

14.2.1.5 Wings

It was mentioned that the wings on the chair back were too high. Thus they were not used to full effect. Particularly in providing reassuring support to allow users to sleep.

14.2.1.6 Reclining backrest

People favouring recliner chairs found it difficult to adjust to a fixed upright seat back. Describing their frustration of not being able to recline made them feel restless. One participant felt unable to 'unwind' with the back upright.

An option to have a reclining seat back would increase the number people able to use the chair. Particularly if the back rest action and any footrest action were independent.

A reclining feature was considered a 'luxury' addition to the furniture.

14.2.1.7 Adjustable seat

The chair and footrest have several points of adjustment to accommodate people of different body sizes, types of arthritis, affecting different parts of their bodies and with different levels of mobility.

One participant suggested being able to make easily achieved adjustments to the chair so that different postures could be supported during different activities.

Professor Mark Porter was convinced that more adjustment to the seat would be of benefit the sitter, i.e. reclining, tilting and swivelling. The rationale given for these being desirable was that this would avoid 'postural fixity', avoid constraining individual's posture so distributing pressure. I did not identify these movements as being appropriate for this group of users without further and careful investigation, this would be an interesting future project.

14.2.1.7.1 Height adjustment

The height adjustment of the chair and footrest was an important issue:

- Users were reassured that in the event of a 'flare-up' the chair and footrest could be raised to make sitting and rising easier, equally, during a 'good spell' the furniture can be as near in height to other pieces in the room.
- People who experienced joint replacement surgery thought that an easy lowering adjustment would be useful during rehabilitation.
- Users with swollen ankles found that by raising the footrest they could ease swelling.

14.2.1.8 Arms

One participant wanted to be able to raise and lock the arm of the chair to support painful hands, wrists and arms, and to reduce swelling.

14.2.1.8.1 Moveable surface

Arm mounted surfaces were considered a useful feature. It was noted as being convenient for writing.

The arm disc concept could be further developed to be one or more moveable surfaces, brought closer when needed but freeing the upholstered arm during relaxation.

One participant wanted a moveable surface which could be put out of sight when receiving visitors. This would also solve the problem experienced by two participants who noted the arms obstructed limited space.

14.2.1.8.2 Position of cup holder

Although the arm discs, for holding a drink, were considered useful by half of the participants, there was a concern that it placed hot fluids too close to the body and that there would be spillages.

In fact, four people reported slopping their drink. The sideways movement of the seat, caused by the 'play' in the gas stem, was mentioned as being responsible or as the sitter moved in their chair. Two participants explained that they placed their drink on the arm disc before they sat down, and as they did so the drink was disturbed. This would indicate, although there were some advantages in having the cup holder on the arm rest, it might be advisable to situate it on the cabinet.

The timber arm discs were found to be uncomfortable by five of the participants, described as 'hard' and 'cold'. Particularly when they tried to relax and over a period of time. The contrast of the upholstery and the junction or the arm disc was disliked.

14.2.2 Upholstery

14.2.2.1 Density of the seat

Although users stipulated a 'firm' cushion. Almost all of the participant's commented that the seat was very firm, hard, or too hard over a period of time. Only one participant commented that they did not really mind that the seat was firm.

On three occasions, the seat was collected from participants earlier than planned cutting short their testing programme. Action was taken if participants experience any numbness, tingling in the legs. One participant felt that an ishcial gluteal bursae had been aggravated.

The density of the seat is an essential comfort factor, it would appear that the wrong density of foam was used, or the fabric was tensioned across the foam too tightly, so that it was not able to fully expand.

The foam and fabric should support body weight yielding sufficiently to avoid aggravating or causing any pressure sensitive conditions.

14.2.2.2 'More padding'

The comments that the seat, back and arms should have 'more padding' may be because of the apparent firmness of the foam structure as explained in the point above, or it may have been because of the slim appearance.

There was a request that the chairs should appear more bulky, look 'more like an armchair' and that they should have a more 'comfy style'.

14.2.2.3 Cushions

Two independent cushions allowed for easy adjustment. Although four participants complained that the cushions moved too easily. One suggested that a built-in lumbar support may be preferable. The readjustment to reposition the cushions proved frustrating, required assistance and caused discomfort.

Several participants rejected the upper cushion.

14.2.2.4 Upholstered covers

The prototype chairs have identical structures but the are covered differently.

Three out of five participant's who tested the red prototype described the fabric as 'slippy', which meant that they slid forward or out of their chosen position.

The cream upholstery was considered to be an impractical colour. However, despite its undyed cream colour, it was intend to be dark green, it does appear to have been a serviceable surface texture.

The upholstered cover was recognised as means by which the chair could look different for different environments.

Although the results from **Postal survey** indicated a preference for a removable and washable cover, one participant explained that it would be too-painful-a-job to manipulate the cover, as well as being 'another job' to be done.

14.2.2.5 Day blanket

The day blanket received a positive response. It was considered to be warm, light weight and easily handled.

14.2.3 Footrest

Two participants mentioned that the chair and footrest combination provided a more favourable posture than sitting on the settee.

One of the participants was happy that the footrest had a large enough area to support and protect her legs from being accidentally knocked by her children as they passed by.

Being able to adjust the height of the footrest, was considered useful for raising the legs and reducing inflammation.

One of the participants felt that the footrest was awkward to adjust or move, seeming to make it frustrating to use.

14.2.3.1 Chair & footrest bases

The chair and footrest bases were described as looking 'officey' and two of the participants expressed a preference for the longer style upholstery which covers them. Only one participant said they liked the exposed bases.

14.2.4 Cabinet

Seven participants tested the cabinet. It was generally received positively. It was used as a workstation by one participant and three others commented on the convenience of having their belongings nearby, where they could be easily located, making life easier from themselves and in one case their carer.

There was a suggestion that a more light weight cabinet could be a success. Also, that it could look more domestic if the timber had a darker stain, the lighter timber raised associations of hospital bedside lockers.

14.2.4.1 Stick/crutch storage

The stick/crutch storage needs side access, rather than from above, maybe a hinge mechanism, so that a stick or crutch could be inserted from a seated position.

14.2.5 Individuals, their habits & preferences

14.2.5.1 Aesthetic preferences

14.2.5.1.1 Finished to user's taste

The furniture must match the user's decor, i.e. with a darker stained timber or timber tops to the chair and footrest bases.

14.2.5.2 Sleeping

People who usually slept in their chair, had to go to bed when they were using the prototype. The wings were considered a feature, which if repositioned, could provide a better support for sleeping also the if the chair had a reclined chair back.

14.2.5.3 Participants tended to use more than one seat

I assumed that people would have one chair, but in fact several participants owned and swapped between two or three, depending on how they were feeling and what they were doing. This was partly to ease pain and find relief in an alternative posture, but also to have a change of scenery.

14.2.5.4 Familiarity with product influenced notion of comfort

During the post-testing interviews three participants mentioned that as they became more familiar with the prototype they were more at ease with it, even more comfortable.

Also during a design meeting - testing a mock-up, comments where passed that people appreciated a 'personal consultation' when considering a chair. These points could be developed in considering how a disability product should be marketed, i.e. whether a trial period would be feasible.

14.2.5.5 Pricing

Participants were asked how much money they would pay for a product like the prototype they were testing. These have been presented in the table below firstly showing the ranges stated by the participants and then these figures were averaged, perhaps suggesting a retail price?

In a direct form, the prices indicate the amount of money that user's would spend on each item of furniture. (This survey could be more in depth and wide spread for more accurate figure.)

Item	Retail prices between these extremes	Averages of suggested retail prices
chair	£700-100	£320
footrest	£400-25	£115.33
cabinet	£200-25	£102.72
day blanket	£50-10	£20
cushions	£40-3	£18.72

(The workings for these figures can be found in the chapter **Pricing** in the **Appendices**.)

14.2.5.6 Ownership of ideas

Ironically, once participants were engaged in discussing design issues they suggested most imaginative and diverse ideas, however if a similarly diverse idea was presented to them 'cold' then they tended to be more conservative. An interesting area for examination would be ownership of idea, and how an involvement in the conception of an idea fosters an interest in the end product.

14.3 Conclusions of prototype testing

14.3.1 Benefits from project

Users commented that they benefited from participating in the study:

- CR discovered foot rests
- CJ was thinking about purchasing a cabinet, without casters

- YM was developing a critical eye, just in time for purchasing new furniture and would make a day blanket.
- Each participant also received a leaflet produced by ARC 'Are you sitting Comfortably?', giving advice on seating and suggestions on how to choose a chair.

This design research project progressed because of the participation of product users in all developmental stages: writing the design specification, production of sketch ideas, assessing mock-ups and home-based user trials.

14.3.2 Design criticism is easier than design practice!

It is easier to philosophise about and criticise design than to practically design, and produce documentation for, a successful product.

It is possible to make presumptuous and incorrect statements, but more likely intangible ones which remain vague and difficult to quantify in design terms until they are tested.

14.3.3 Need for prototype III

Not every design problem were resolved in one design, particularly its first generation. As a result of the case study, clear design criteria are outlined for prototype III, to test again with users. This kind of evolution is a Kizen process, small incremental changes mean fewer discrepancies needing fewer adjustments. The frequency of good points increase for more users. A manufacturing and marketing feasibility study could then begin.

For these design ideas to be sophisticated enough to manufacture a number of further prototypes are necessary. It is usual to work with several generations of prototypes, (Lewis, 1997)[705] illustrating there are many stages of refinements along the route to production.

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705 'Priestman Goode would expect to be working on the project (a 'small electrical product' such as a camera) for just over a year... Up to 50 cast models produced for product testing and samples for exhibitors and product launch.'
Lewis, J. (1997) Design Week, Free Market, 1.8.97, p15

14.3.4 Anthropometrics: consider body measurements not just height

The following illustration shows how individuals' body parts differed in dimension despite having an identical stature. Three people who tested the red prototype chair, all 4'11" in stature, had very different sitting experiences: one person could sit on the chair and put her feet on the floor, but the other two could not. One person could make complete use of the arms, the other two could not.

14.3.5 Identified gap in the market

This study identifies a gap in the market for the introduction of a seating hybrid, transferring technology and possibly some the components, from the design of contract seating to domestic seating. Bringing the understanding of the importance of adjustable features and ergonomic seating positions to the domestic environment.

14.3.6 Economical use of productions systems

The manufacture of this furniture would involve a range of production techniques. The majority of the component fittings would be mass produced and 'bought in'. The assembly would be in a batch production arrangement, around the users' specifications. The covering would be a bespoke design adapted from a selection of patterns to the users choice of fabric and finish.

14.3.7 Choice provides for different people's taste

By providing choice and a sense of ownership by being involved in choosing the form of furniture, through finishes or components.

14.3.8 Informal contacts most valuable

Design research approach: not always the most formal approaches or contacts were the most productive. Organisations could be concerned with membership details, whereas individuals had more autonomy and could assist more readily.

14.3.9 Findings from the Fisher's exact test results

14.3.9.1 P-value of .004

middle back * loose (cushion/s)

Back/neck impairments – including neck, shoulder, top of back, middle back, lower back (3.4) with loose cushion/s (2.2)

		Loose (cushion/s)		Total
		0	y	
Middle back	0	28	7	35
	y	4	9	13
Total		32	16	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .004

In this cross tabulation, there is a strong statistical significance[706] indicated by P-value of .004.

Those respondents with a middle back impairment were significantly more likely to express a preference for a chair with a loose cushion/s.

The 'odds ratio' is (28 x 9)/(4 x 7) = 9, i.e. those with lower back were 9 times more likely to ask for a loose cushion/s.

This result presents a clear design direction: to further consider the type and use of loose cushion/s.

[706] 'Significant' means that an association is unlikely to be just chance.

14.3.9.2 P-value of .051

The second notable result, although not strictly showing a statistical significance, was from the analysis of respondents with knee impairments with the preference for having arm rest on their chairs.

arms * knees

difference impairments make on design preferred/ suggested features:

Knee impairments (3.4) with arm rests (2.1)

		knees		Total
		0	y	
arms	0	6	9	15
	y	4	29	33
Total		10	38	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .051

The P-value of .051 shows an association between these two variables. The 'odds ratio' being (6 x 29)/(9 x 4) = 4.8 and this difference is unlikely to be due to chance.

This is valuable information for a furniture designer working with people with impairments. It proves there is a justification to concentrate on these variables in the design process.

Respondents with knee impairments were 4.8 times more likely to request arms on their chairs.

14.3.9.3 P-values within the range of .110 to .201

In this section, there is no statistically significant evidence of an association, but such evidence may well have emerged had the sample been larger.

head rest * middle back

Difference impairments makes on design preferred/suggested features:

Back/ neck impairments including neck, shoulder, top of back, middle back, lower back (3.40 with head rest (2.1)

		Middle back		Total
		0	y	
headrest	0	12	8	20
	y	23	5	28
Total		35	13	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .110

foot rest * top back

		Top back		Total
		0	y	
footrest	0	16	4	20
	y	16	12	28
Total		14	34	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .127

lower back * loose (cushion)

Back/neck impairments – including neck, shoulder, top of back, middle back, lower back (3.4) with loose cushions (2.2)

		loose (cushion)		Total
		0	y	
Lower back	0	16	4	20
	y	16	12	28
Total		32	16	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .127

recliner * top back

difference impairment makes on design preferred/suggested features:

back/neck impairments – including neck, shoulder, top of back, middles back, lower back (3.4) with recliner

		Top back		Total
		0	y	
recliner	0	29	12	41
	y	3	4	7
Total		32	16	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of.201

14.3.9.4 Results indicate future design direction

The 'top six' in the Summary table of analyses could be used to direct future design work on these prototypes.

variable a	variable b	P-value
middle back	loose (cushion/s)	.004
arms	knees	.051
head rest	middle back	.110
foot rest	top back	.127
lower back	loose (cushion/s)	.127
recliner	top back	.201

A specification emerges from the summary table, that caters for a range of mobility impairments: middle back, knee/s, upper back, lower back

A chair which incorporates into the design: loose cushion/s, arms, a head rest, foot rest and a reclining back.

14.3.9.5 Evaluation of Statistical analysis

To achieve more statistically significant results, a larger sample group is necessary: hundreds of respondents rather than fifty. To obtain a view as to how many respondents would be required for such a survey, a 'power analysis' can be carried out.

Generally speaking, results from a large, specifically targeted sample group can be used to determine more subtle information. More complex calculations could be used, i.e. multivariate analysis.

14.4 Project conclusions

14.4.1 Conclusions: design solutions from process

This section explains the process adopted in the thesis then proceeds, through a series of illustrations, to indicate the stage at which the designs realised their unique features.

14.4.2 How have design solutions been achieved?

Literary references suggested the boundaries of the project, then provided specific and necessary details to progress on to the practical design development, such as anthropometric data.

Initially, it was assumed that by collating the contextual research based on medical information, anthropometrics and aesthetics, clear paths of user commonalties, even preferences, would be revealed and these could be used to design one Universally acceptable chair. In fact, the primary and initial secondary research, such as the postal survey, only proved to highlight the diversity of peoples' physical and aesthetic needs and desires.

Results from the user group postal survey, design meetings, questioned & examined the initial design brief and refocused it where necessary.

This prompted a paradigm shift from: a medical model approach, expectations based on my own experiences and a selected & pre-determined design process - whereby a designed prototype would be built as a physical hypothesis and then tested with a sample of a user group, to a social model and qualitative research approach.

Information gathered in this way and from this 'world view' almost certainly differed from that originally anticipated, moreover the frequency and means of data collection, was shaped by product user consultation.

Using the notion of postulates: using a statement from which to work rather than a hypothesis which can be proven, and by believing the initial conceptual ideas had room to shift, information gathered could be applied and utilised **within** the process.

A series of increasingly intimate meetings with individuals from the user group meant that contact was maintained thought out the research and design development process. Results of dialogues on aesthetics, comfort and quality, directly influenced the form of the furniture.

During the practical design development, the way that user data was most useful & readily drawn into designs was to keep the information as 'unprocessed' as possible. Features described by the product users became the design criteria, valuing the participants' experiences.

To meet differing function requirements, established needs and aesthetic desires, a modular assembly design system was developed. It uses bought-in mass produced components, combined with new batch produced elements and finally upholstered to meet the users established interior tastes and desires. The visual identity of the group of products could be determined by the tailoring of the outer upholstery.

14.4.3 Design features

The following visual summaries indicate the stages at which the various design features were realised. Six stages have been identified:

Literature Search, Postal Survey, Meeting with the Users, Visual References, Design Process, Home trial of Prototype

The furniture would have been very different without the design methodology generated by the consultation process. The summaries illustrate when each of the design features were consolidated.

14.4.3.1 Results obtained from literature search

Upholstery colours would be bold & bright, perhaps leather?

A fixed high backrest would provide a satisfactory seating position for all uses?

Storage could be incorporated within the design of the chair?

Potential development of arms for support & storage space

Pull out surface enlarges work area

High seat for easy seating & rising

Depth of lower drawer to accommodate hanging files.

Once necessary ergonomic & anthropometric information is collated, one satisfactory chair could be designed for all users?

14.4.3.2 Results obtained from postal survey

Preferred colour/ pattern & texture of upholstery

The high backrest was by user request & to provide head support.

Removable covers requested by user.

Desired feature: a place put a cup, a place to put a book etc…..

Storage desired for keeping small possession such as remote controls, cigarettes, telephones & tablets

High seat respondents avoided low soft chairs.

Depth of lower drawer to accommodate hanging files.

Castors allow furniture to be easily moved.

14.4.3.3 Results obtained through meeting with the users

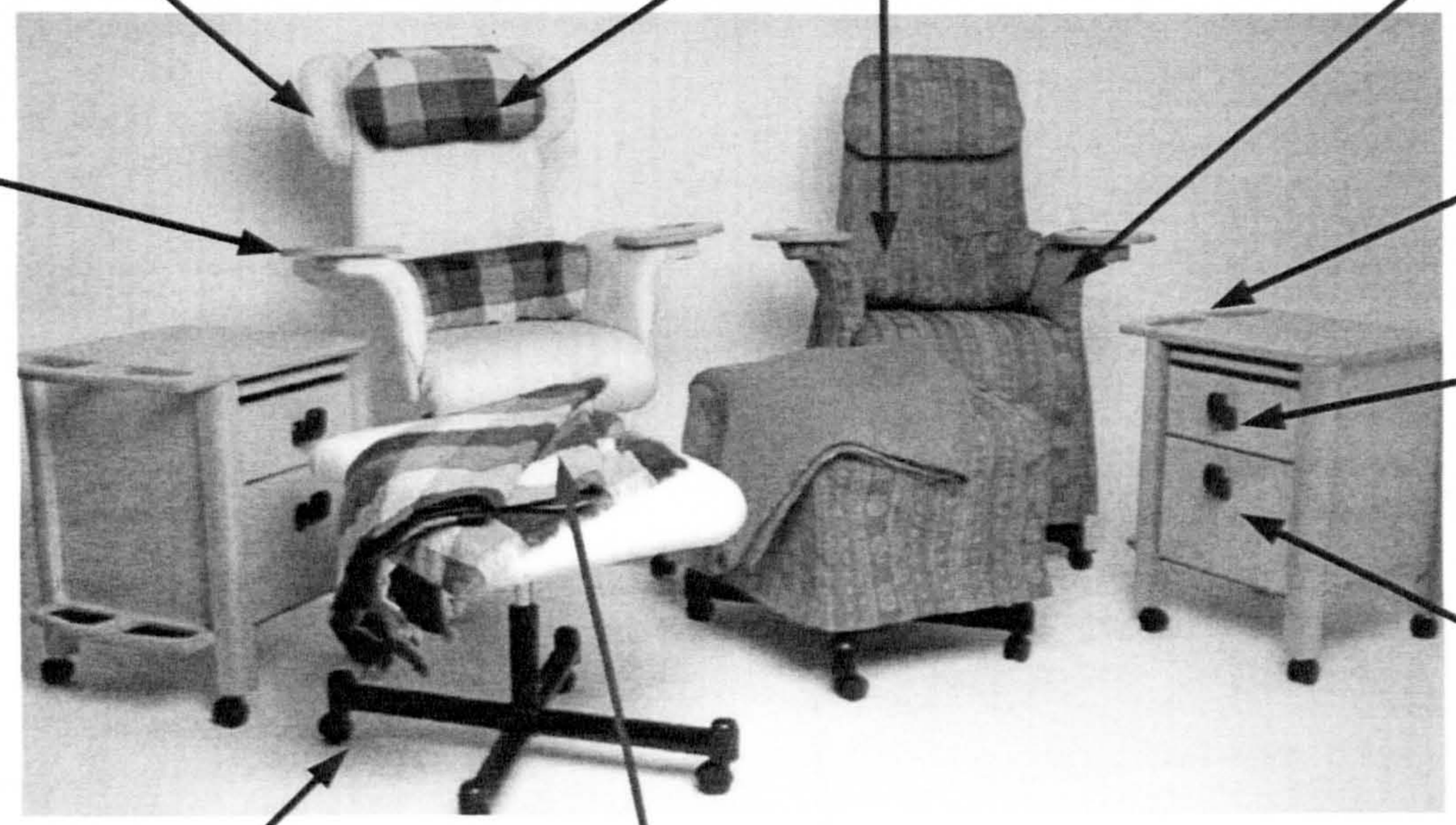
Wings were included by user request. They are optional & height adjustable for users of different stature.

Two easily adjusted cushions, for neck & lumber curve. (Design Meeting)

Users perceived piping details on the edge of the upholstery as an indication of 'quality'.

End discs were requested to be timber finish for gripping whilst raising/ lowering from chair.

Stick & crutch storage by user request. (Design Meeting)



Handles for a non standard grip. (Design Meeting)

Depth of lower drawer to accommodate hanging files.

Contract components used because of the need for adjustability, the users were of different stature. Raising & lowering seat height was considered beneficial before or after a knee, hip or foot operations, where mobility would be restricted. (Design Meeting)

Day blanket developed from initial design concept of being attached to the chair & refined through Design Meetings

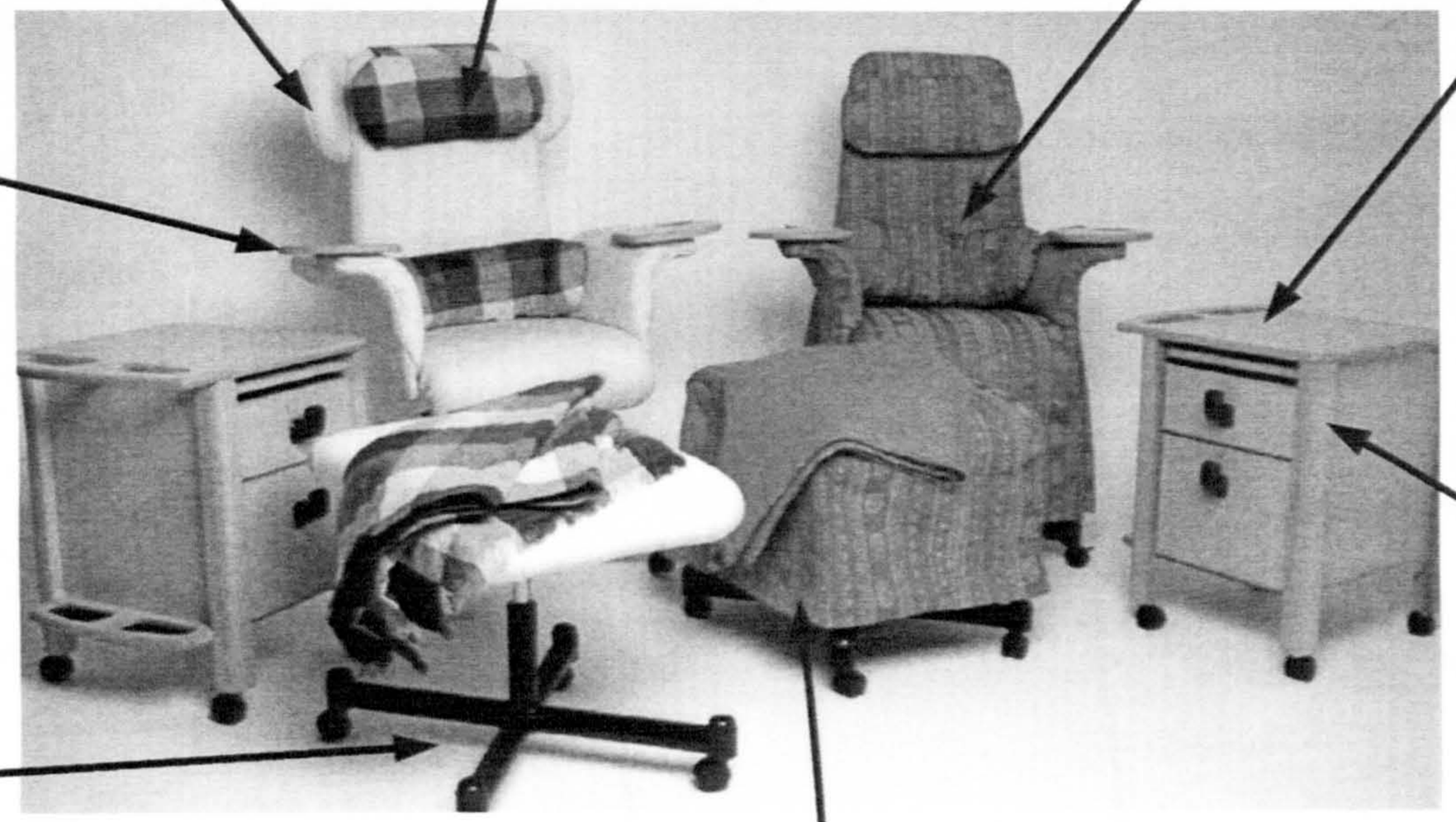
14.4.3.4 Results obtained through visual references

Two cushions seen on the HAG office high backed chairs- Signet Collection

Counter weight of the top cushion. Similar notion to Parker Knoll?

A simple pull on cover was developed as one upholstery option after study Vico Magistretti's Sinbad for Cassina, 1981

Arm discs After Mary Little's Armchair, 1985; A gentleman's reading chair from Keddleston Hall, Derbyshire; Witzig & Jahns' Vito for Sitag International



Simple cabinet: similar in proportion to some bed side tables, Jasper Morrison, 'Universal System' for Cappelini,1991 & Hecht's Mobile Furniture for IDEO's office,

Reconciling the aesthetics of the contract seating in a domestic environment after Pearl Dot's Spineline Circa 1991; Charles & Ray Eames' Aluminium Collection, 1958

Allied activity based storage after Donato Di Bello's Mixo System, 1994; Shiro Kuramata's Chair with Drawers, 1991; Shaker Sewing Chair & Shoe maker's bench, 1841, Shaker Museum, Old Chatham N.Y.

Separate footrest after Charles Eames '670' Chair & '671' Ottoman, 1956 or Marc Newson's Gluon for Moroso, 1994; or Ludwig Mies Van der Rohe's Barcelona Chair & Barcelona Stool, 1929.

14.4.3.5 Results obtained from the practical design process

The arm discs were routered MDF to give a smooth edge radius. For consistency the same thickness of cabinet top was used, & the same radius.

Lower cushions remained wedged into position & did not need any predicted fastenings

The upholstery would be designed and made to the End User's specification, either modifying standard pattern of possible a one-off design: Hard wearing or more delicate fabric, colours, textures and most of all design of tailored cover.

The curve of the arm rest was formed by laminated ply. Its radius is the same as that used in the seat. It is more comfortable for the arms to rest against a curve that a 90 degree junction.

The disc for various uses: a recessed area to put a cup, a place to put a book etc.....

The ply components of the chair seat, back, arms and footrest would be bought in

Handles were cast in resin for the prototypes

Contract components would be bought-in in large quantities and stored until needed.

Depth of lower drawer to accommodate hanging files.

Day blanket developed from initial design concept & refined through Design Meetings

Seat casters lock, footrest & cabinet are free moving.

14.4.3.6 Results obtained through home trial of prototype

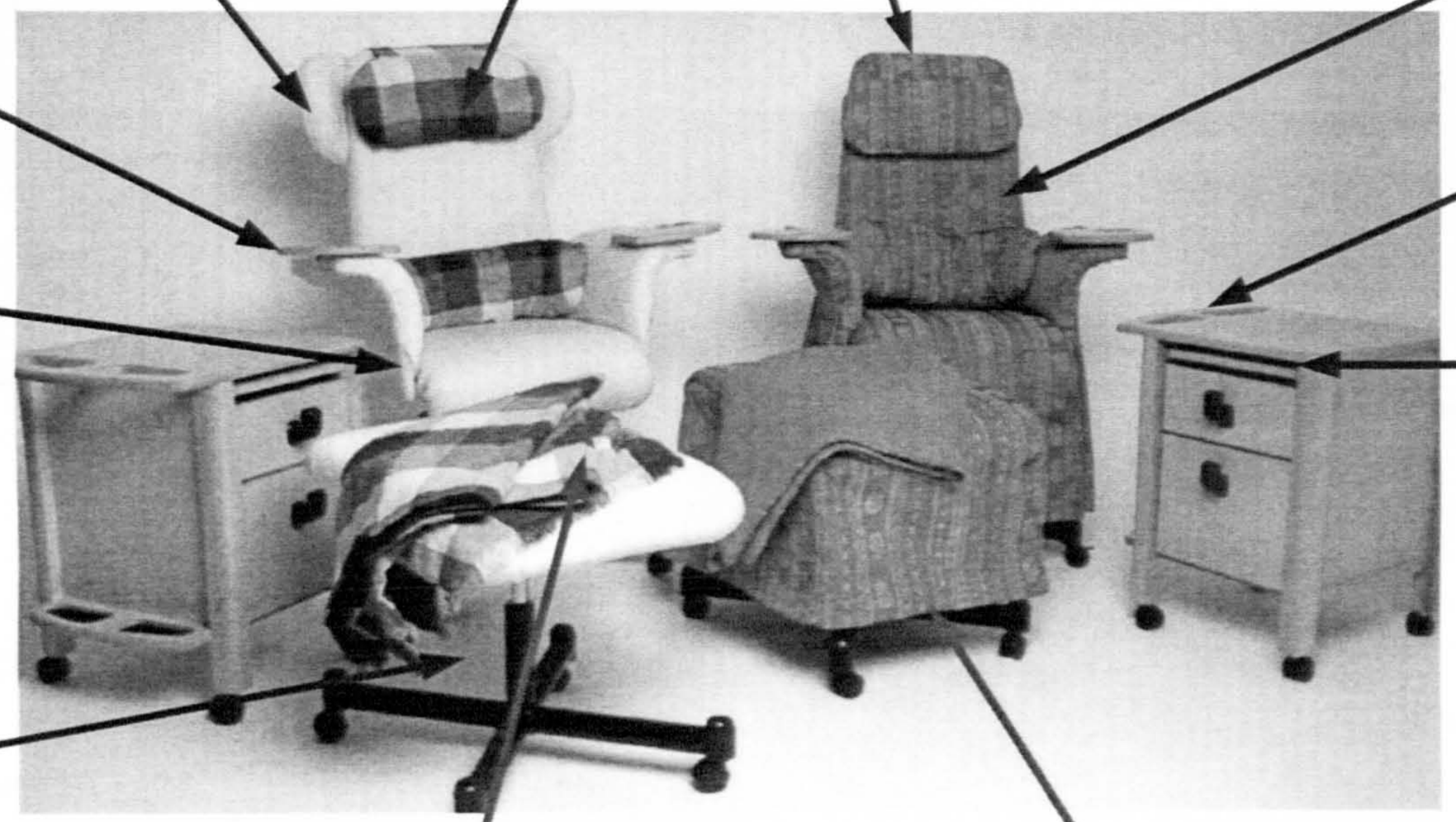
Wings were too high and shallow in form to be beneficial to users

Some users preferred a single cushion.

The finish of the red fabric proved too 'slippy' for one user.

Incorporating a reclining back mechanism would widen the customer group for the design

Timber finish proved hard under the lower arm during relaxation time.



Stick & crutch storage successful

Height adjustability in the seat & footrest was seen as a valuable feature.

Cabinet acted as a work-station of one user. It was practical for storage.

Bought-in seat stem proved too high to users of smaller stature.

Day blankets were considered a simple & effective compliment to people's seating experience.

The footrest was found to be useful & people who had not used one before decided to acquire one after using the prototype.

14.4.3.7 Results obtained through statistical analyses

(Taken from the summary table of analyses with P-values up to .201.

Impairments were grouped into body locations such as top back/ middle back for ease data entry during statistical analysis.)

Respondents with middle back impairments requested a head rest.
(head rest* middle back P-value of .110)

Respondents with top back impairments stated a preference for recliners.
(top back * recliners P-value of .201)

Respondents with knee impairments requested that the chair have arms.
(arms* knees P-value of .051)

Respondents with middle back impairments requested that the furniture have a loose cushions.
(middle back * loose (cushions) P-value of .004)

Respondents with top back impairments requested a footrest.
(footrest * top back P-value of .127)

Respondents with lower back impairments requested that the furniture have loose cushions.
(lower back * loose P-value of .127)

14.4.4 Working assumptions - postulates

Through the course of the project several statements gained significance and were used as assumptions with which to work. The initial course of the project was to identify design criteria by a literature search; consult paramedics, manufacturers and product users; design a contemporary looking chair that appeals to younger people and takes into consideration the broad psychological, aesthetic needs and desires of individual users; test it with a willing user group; prove that the concepts worked; suggest ways it might be applicable to other users groups and write up the project. (Maykut & Morehouse, 1994)[707]

With the benefit of the contextual research, the object of the case study - the chair, became a chair, footrest and cabinet. Furthermore as the design developed its frame could be adjusted, consisting of contract components, to be assembled by batch production whilst being finished to the user's specification. In the beginning, it was surprising that the findings of the contextual research would lead to a revision in emphasis of the case study. Until it became clear that this was the way that ideas were clarified or challenged and progress made.

Occupational Therapists were consulted on the seating sketch designs and mock-up during design meetings, but in comparing these with the results from the user group the subsequent focus of the study was solely on the product user. Professor Mark Porter, an ergonomist, interested in the physiological effects of sitting, critically evaluated the prototypes. Any detailed contact with manufacturers has be saved for a separate future feasibility-type study.

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[707] 'The traditional scientific method is further equated with generating a hypothesis, testing it, and generalizing the findings to the larger population.'
Maykut, P. & Morehouse, P. (1994) Beginning Qualitative Research, A Philosophic & Practical Guide, The Falmer Press, London & Washington D.C., p16 & p10-11

The most satisfying and productive and advances where made when evidence emerged from the case study or project and directly proved or disproved active postulates. It was only by unravelling the reasoning behind certain notions that progressions were made. (Jones, 1993)[708]

14.4.5 Disability product's function & aesthetics - postulate (1)

The idea that some disability products look peculiar because their functional elements are considered out of context with the way that the product will be used and the desires of the product user, still holds true. In responding to the product design specification - the features required by the product user, a single piece of furniture was designed which tried to do everything and satisfying all the requirements at once. Despite meeting the product specification, this design was rejected as undesirable during a user group design meeting. So an alternative concept of a family of separate pieces was pursued as being appropriate.

Shackel, Chidsey et al. (1969)[709] raised the questions: would the aesthetics of a chair, its 'appearance, colour and related factors' effect the user's 'acceptance and regular usage (or tolerance)' of it ? And are 'fashion and status' influential features? The experience from the design meeting would prove that the aesthetics of a product is a critical factor.

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[708] 'The initial expression of objectives, or needs, however abstract and absolute it may seem... are full of hidden assumptions about how the person starting it thinks it can be satisfied.'
Jones, J.C. *in* Mitchell, C.T. (1993) Designing: From Form to Experience, p50

[709] 'As a final suggestion, which might equally be placed under the heading of Chair Selection, there is the question of appearance. How far do the appearance, colour and related factors enter into or influence a person's choice, and his subjective responses when acting as a subject, and how far do they affect his ultimate acceptance and regular usage (or tolerance) of a chair? As part of this area of investigation, it would be desirable also to include factors such as influence of fashion and status.'
Shackel, B., Chidsey, K.D. et al. (1969) Ergonomics, The Assessment of Chair Comfort, vol.12, no.2, p303

Confirming Dormer's (1995)[710] explanation of the integral nature of aesthetics '...appearance and appeal being a part of the function of design.'

14.4.5.1 Balance between aesthetics and functional considerations

Having begun the project concerned about the aesthetics of disability products in order to produce the prototypes functional details and standards of the chair, footrest and cabinet became predominant.

The sketch development stage was the most freely creative stage, where the possibilities were numerous. The process of manufacturing the design became more specifically functional and more a matter of achieving tolerances in order to produce a quality prototype.

14.4.6 Design & disability mission statement - postulate (2)

Disability products can be designed to suit disabled people:

> Products can be designed which physically disabled people can make full use of and that they do not need to make adaptations in order to use them. The user should not have to compensate for inappropriate design, so saving time, energy and effort. Products can be desirable and provide sufficient choice to reflect the user's taste. Products can be designed for the consumer disability market.

Adjustments and choice were the key areas for consideration in order to address the second postulate. There was not one single design which would suit different people with one, or more, of the many forms of arthritis, and possibly other disabilities.

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[710] Dormer, P. (1995) Furniture Today, London: Crafts Council, p21

This was emphasised by the participant's diverse response to the mood boards, reinforcing that nor was there a 'common denominator' of taste to satisfy or appeal to all of the users.

14.4.6.1 How design fits into the social model of disability

The journey through this thesis has highlighted that close scrutiny of people, because of their medical condition is against the social model of disability. (See chapters under the heading **Contemporary perspective of disability)**

This design project has referred to the social model of disability as a mission statement because it of the apparent need for 'medical model' minutia. There are contradictions when designing to include disability: the social model of disability advocates an inclusive, non-medical approach to the user yet to answer the brief, designing to include people who have a mobility impairment i.e. arthritis, then their specific requirements must be considered. Arguably this is seen as perpetuating the Individual model of disability. (Poole, 1999)[711]

14.4.6.2 Universal design or design for specific needs?

There is a point of view that 'universal products' can suit everybody, thus removing the need for 'special' products for disabled people.

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[711] The apparent antithesis described in a posting to an architect student on an internet Mailbase Disability Research (disability-research@mailbase.ac.uk: a forum for debate and an opportunity to raise issues with people sharing the same topic of interest.)

'...in order to design to include people, who are ordinarily excluded by environments and products etc., their characteristics need to be considered in detail. This would seem to perpetuate the individual model, even if the overall aim is to work towards a more inclusive utopia.'

Poole, L. (5.2.99) in response to a thread on Disability Research Mailbase 'Towards barrier free architecture', ideas sent to Zoe Holland

The idea of an increased market would make universal design appear an attractive option, however, I do not agree that it is possible for one design to suit everyone. In fact, I think that it does not matter if the product being designed only suits a sliver of the population, so long as there are products that suit everybody appropriately and effectively: they 'feel' and 'look' right to the user, and reflect their aspirations.

I believe the issue is not the size of the product's constituency but how appropriate the design is to the user.

14.4.6.3 Hybrid came from looking at a specific, medical condition

Indeed, if the design project had not specifically looked at designing seating for people with arthritis and finding ways to accommodate a fluctuating condition then the hybrid concept, of using office components in a domestic environment, may not have come about.

By settling upon a means of delivering an individual answer for the defined user group for this project perhaps some elements of the design could be classed as universal, i.e. mass produced, high volume components, but these would be individualised by a bespoke assembly. These thoughts were put to Liz Crow (12.2.99), a disability activist and author, who reiterated these ideas in her response to my email titled 'New project outline':

> 'I think for sheer practicality, products need to have a broad standard - products might be used by a specific individual, but also might well be for use by many members of the public - but within that standard there needs to be much scope for variety of standards and adapting to individual requirements.'

14.4.7 Seating needs of younger people - postulate (3)

The third set of assumptions, used for defining the design specification, were that the needs of younger and older people with arthritis would be considerably different:

- older people spend more of their day wanting to snooze and much of the design emphasis would be concentrated on assisting people in and out of their chair.
- younger people spend more of their day awake and need provisions made for their seated activities and need less assistance in rising and lowering onto their chair.
- the interrelationship of the sitter, chair, accessory furniture and activities done whilst seated will be the main area for development.
- younger people want a more bold and contemporary aesthetics, allowing for free and creative product identity.

Although this study did not work with a group of older people to provide comparisons, the results show that the differences may be less than imagined. It was underestimated how frequently younger people wanted to sleep in their chair, assistance in sitting and rising may also be beneficial. Catering for activities done whilst seated and the inter-relationship of the sitter, chair and accessory furniture did prove to be important and relevant considerations.

There was an expectation that younger people would prefer a more bold aesthetic and this would present an opportunity to develop a novel and contemporary looking design. However, it came as a surprised to realise that younger people could be exceptionally conservative in their choice of aesthetics. Indicating it is not age that determines people's aesthetic choices but personal taste, culture and experience.

This could suggest a widening of the age range of people that the furniture would be marketing towards.

14.4.8 Justifications to proceed with case study & prototype -postulate (4)

- There is a need for seating which meets the outstanding functional requirements of people with arthritis and to be acceptable in the home.

- A seat which promotes a good posture can be restful. By supporting painful joints a domestic seat can be used as part of a pain reduction regime and can avoid contributing to further joint damage. Comfort can be synonymous with easing pain

- Creatively designed seating and accessory furniture can offer choices and a sense of control by making provisions for seated activities as well as providing a place to rest.

14.4.8.1 Seating could alleviate pain

It was originally proposed that the design for a seat would alleviate pain, however having met many people with different types of arthritis, it would appear that this is not a realistic expectation. A product may play a part in reducing, stabilising or avoiding further pain but unfortunately it will not make it go away.

Participants proved that by raising the footrest and thus their legs, they were able to reduce swelling in feet and ankles.

14.4.9 Postulates (5) & (6)

Postulate five is identified as underpinning the design development process.

14.4.9.1 Seating design brief - postulate (5)

- Products, that cater for a wide range of physical ability, can satisfy functional requirements and be acceptable and appropriate to the user;
- Products can be designed in response to observations of human behaviour, habit, posture, need and desire;
  - This can be achieved through direct canvassing of the end user or by such statistical analysis as Fisher's exact test.
- By involving a sample group of users with a broad range of abilities in the design process the product is more likely to accommodate a larger percentage of the user population;
- A flexible design approach can accommodate different experiences and types of mobility;
- An understanding of different types of mobility can inform the design of seating.

14.4.9.2 Product satisfaction achieved by working with the user - postulate (6)

Postulate six indicates the fine balance that design needs to achieve if it is to satisfy the product user. The designer brings his or her own values[712] to meet the design specification, these are brought together in a creative process and outcome. Potential for any product is enriched by consultation with the end user, their values and experiences can be applied to revise and realign the design for its acceptance as a finished product.

> Product satisfaction depends on the relevance of the information gathered and then how it is interpreted and developed into a design. Through close participation with product users it is possible to design to include individuality. This could be the difference between the product being used or not used, or more recently purchased or not purchased. User involvement, is the best way to acceptable and appropriate products.

Once a form of prototype has been developed and accepted by a user group, the further use of analytical statistics could elicit subtle information that could be used in the design development of that product and others besides.

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[712] 'Values are embedded in the research - embedded in the topic chosen for examination, in the way the researcher examines the topic and in the researcher him or herself. If reality is constructed and the knower and the known inseparable, then values come with the turf.' Maykut, P. & Morehouse, P. (1994) Beginning Qualitative Research, A Philosophic & Practical Guide, The Falmer Press, London & Washington D.C., p13

The Design of Disability Products with Special Reference to the User.

Case Study: Domestic Seating for Young Adults with Arthritis.

APPENDICES

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Submitted August 2001

2/2 Volumes

A thesis submitted in partial fulfilment of the requirements of the University of Wolverhampton, School of Art and Design for the degree of Doctor of Philosophy.

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6. List of contacts

David Goda, Statistics, University Of Wolverhampton 08.01

Dr Andy Cooper, Sociology, University Of Wolverhampton 03.01

Malcolm Johnston, Viva Voce 03.00

Dr Frank Harris, Viva Voce 03.00

Dr Laurence Pearl, Statistics, University Of Wolverhampton 08.00

Liz Crow 12.2.99

Zoe Holland 5.2.99

Colin Barnes, Leeds University 9.4.98

Christina Jones-Musa,Sunrise Medical 1.2.98/5.2.98

Malcolm Johnston, Central St Martins 20.10.97

Julie McLeod, British Institute for design & Disability 13.10.97

Stationary Office Publications 29.9.97

Research Support Unit (Ethics Committee), University of Wolverhampton 19.9.97

Kevin Powell, Powell Seating/William Bricknell 25.7.97

Naidex, NEC 15.5.97

Skill, Brixton 13.5.97

Steve Smith, Care Manager Derby City North 13.5.97

Department of Health Storage & Distribution Department, 13.5.97

Jess Payne 25.4.97

David Essam, Du Pont Nylon 18.3.97

Val Mace, Walsall Metropolitan Borough Council

Dr Nigel Leighton, CAPD, University of Wolverhampton 18.3.97

John Miller, Design Strength 14.3.97

Flegg Engineering 4.3.97

Design for Occupational Therapists Course, University of Wolverhampton 2/3.97

Alan Abbott, OCI 23.2.97

Zoe Crutchley

Mr Pickersgill, Belper 22.2.97

EdaAgnes-Day, University of Derby 12.11.96

Guy Raymond Engineering Co. Ltd 22.1.97

Andy Preece, Johnson Controls Automotive UK Ltd 20.1.97

Martin Jones, Insurance Officer, University of Wolverhampton 2.1.97

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Mary Little, London 13.11.96

Carl Jackson, MVC 6.11.96

Cantril Cork, Birmingham

Martin Walker, Beaver Sports 4.11.96

Dave Williams, Williams Office Furniture 1.11.96

P Bromsden, Keddleston Hall 21.10.96

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L. Tooley, FIRA 9.10.96

Valerie Michel , Author of Leather Working Handbook 10.10.96

Introduction to Marketing, Brothers of Charity/ Young Arthritis Care,
Galway, Ireland 19-22.8.96

Lesley Cullen, Psycho Social Research in Rheumatic Diseases, Coventry Uni.
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Colin Cassidy/ Alan Hynde, Hille 17.7.96#

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High Impact Communications for Women, Career Track, Derby 12.7.96

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Introduction to British Sign Language, taught by Andrew Leach 22.1.96-25.4.96

Phil Gardiner, Sedus Stoll 25.4.96

Wendy Mayfield, Leeds Metropolitan University 18.1.96

Pam Oswin, Leeds Metropolitan University 18.1.96

Rover, Coventry 25.1.96

O.T. Department, Walsall 25.1.96

Jean Ashcroft 6.12.95

Chris Ramsden, BIDD 12.10.95

Anice Alexander Selection Committee, CSD26.10.95

Alastair S. MacDonald, Glasgow School of Art 25.10.95

4D Dynamics, De Montfort University, Leicester 21.9.95

Naidex, Wembley Arena, 19-21.9.95

Neville Garratt Centre, Wolverhampton

Upholstery Workshop with Mary Little, Crafts Council, London 31.3.95

Furniture Today Exhibition, Crafts Council, London31.3.95

Flemming Hvidt, Flemming Hvidt Mobler, Denmark 22.3.95

Disability Issues, Level One Module, taught by Megan Davies 10.10.94-21.11.94

Remap Meetings, Stafford District General Hospital 17.10.94

Science for Life Exhibition, Welcome Trust, London

Mr Taylor, Wolverhampton Football Ground 6.9.94

Alan Spindler, Guildhall University 23.9.94

Does He Take Sugar? 6.7.94

CandoCo, Birmingham Convention Centre

K. Schmidt, Design Museum 4.7.94

Design for Disability Summer Show, Guildhall University 28.6.94

Design/Research: Research into; for; through Design, Royal College of Art 20.5.94

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Yamazaki Mazak (Computer Controlled Machine Tools), Worcester 12.5.94

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Daniel Bilbrey, Weilard Furniture USA 5.4.94

Roger Coleman, DesignAge RCA 25.1.94

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7. Secondary research

7.1 Secondary research methodology

Using the project title as a core to the research, I explored associated strands of information. Individual points of reference, literary or visual, were noted and pinned onto board according to topic heading. These topics 'ran into one another'. Where a gap was evident or topics did not 'flow' I sought explanatory sources.

The note board was photographed, as a montage, whenever significant connections were made. This helped to record the project development.

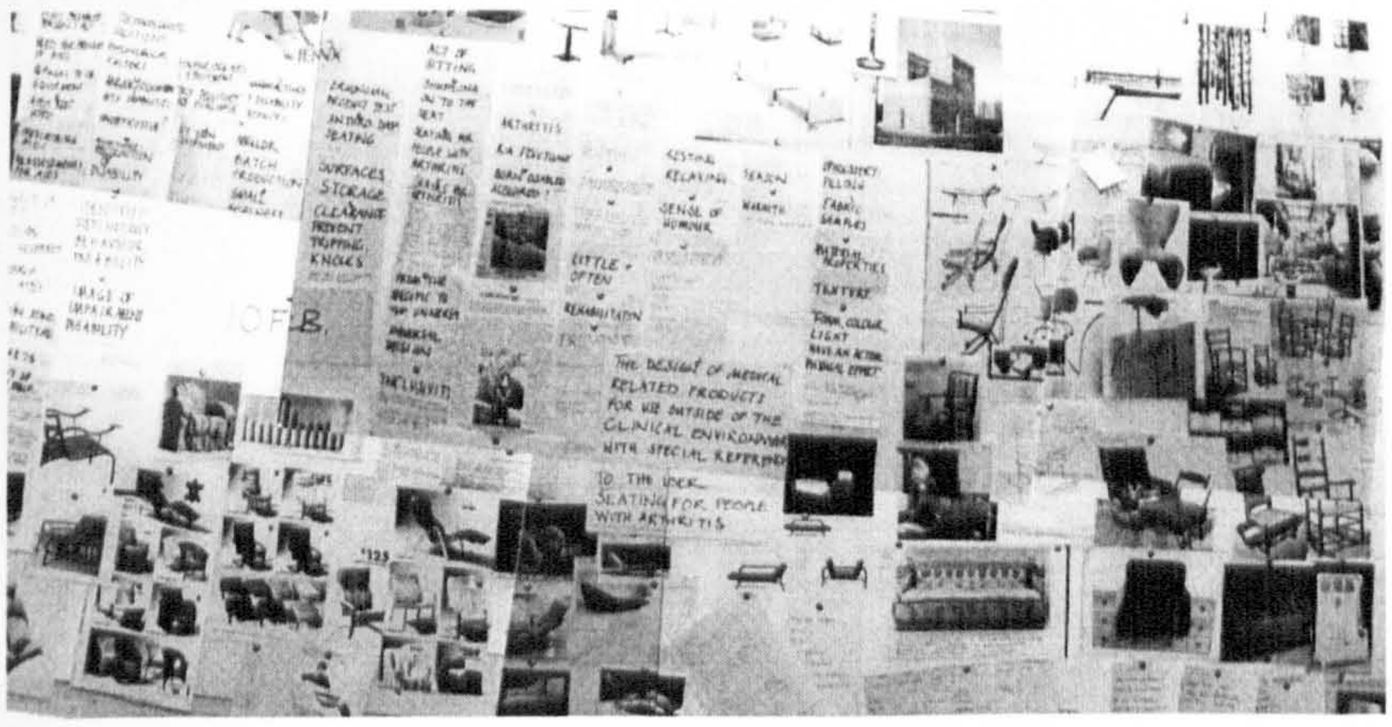

Figure 1. Image of notes on pin board

7.2 Constructing a database

It was then possible to transfer the references from the hand written notes into an electronic format. I used the database Claris File Maker Pro 3.0, to compile references.

Using a database enabled a ready transfer of data from document to document (via electronic cutting and pasting). Having entered the information to the database once by using a series of layout designs, the same information could be reproduced in a number of forms: i.e. topic reference sheets and bibliography.

8. Design models

8.1 Idealised flow diagram of the design process (Cross, 1992)

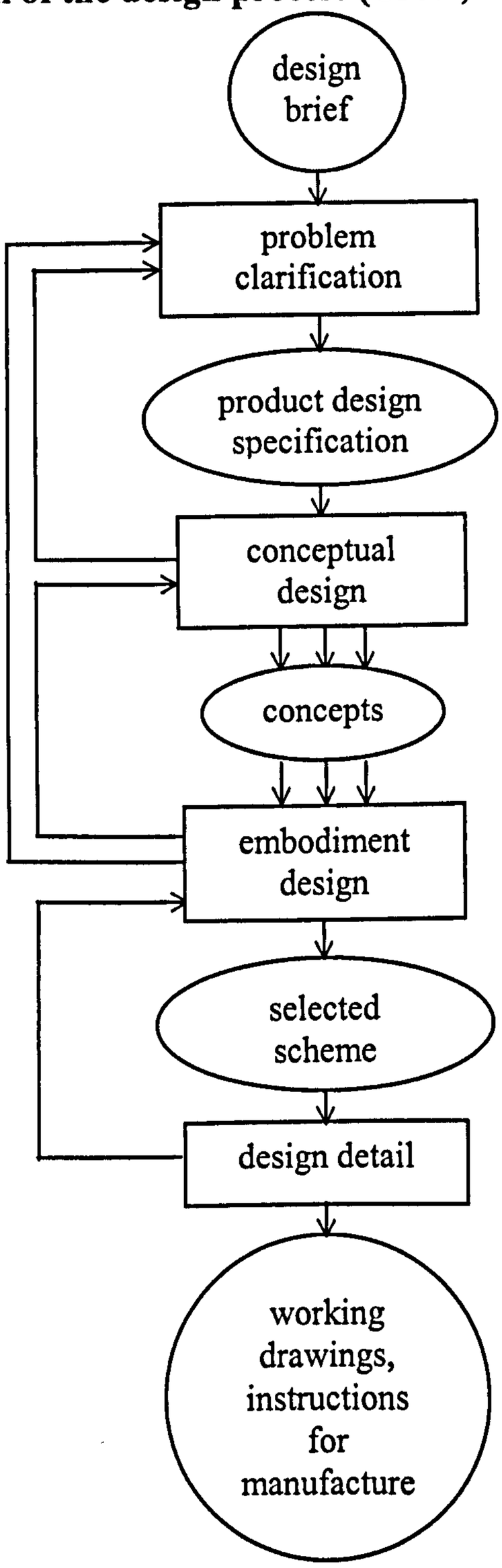

Figure 2. Idealised flow diagram of the design process. (Cross, 1992)

8.2 The process of technological innovation: Ray and Bruce (1984)[1]

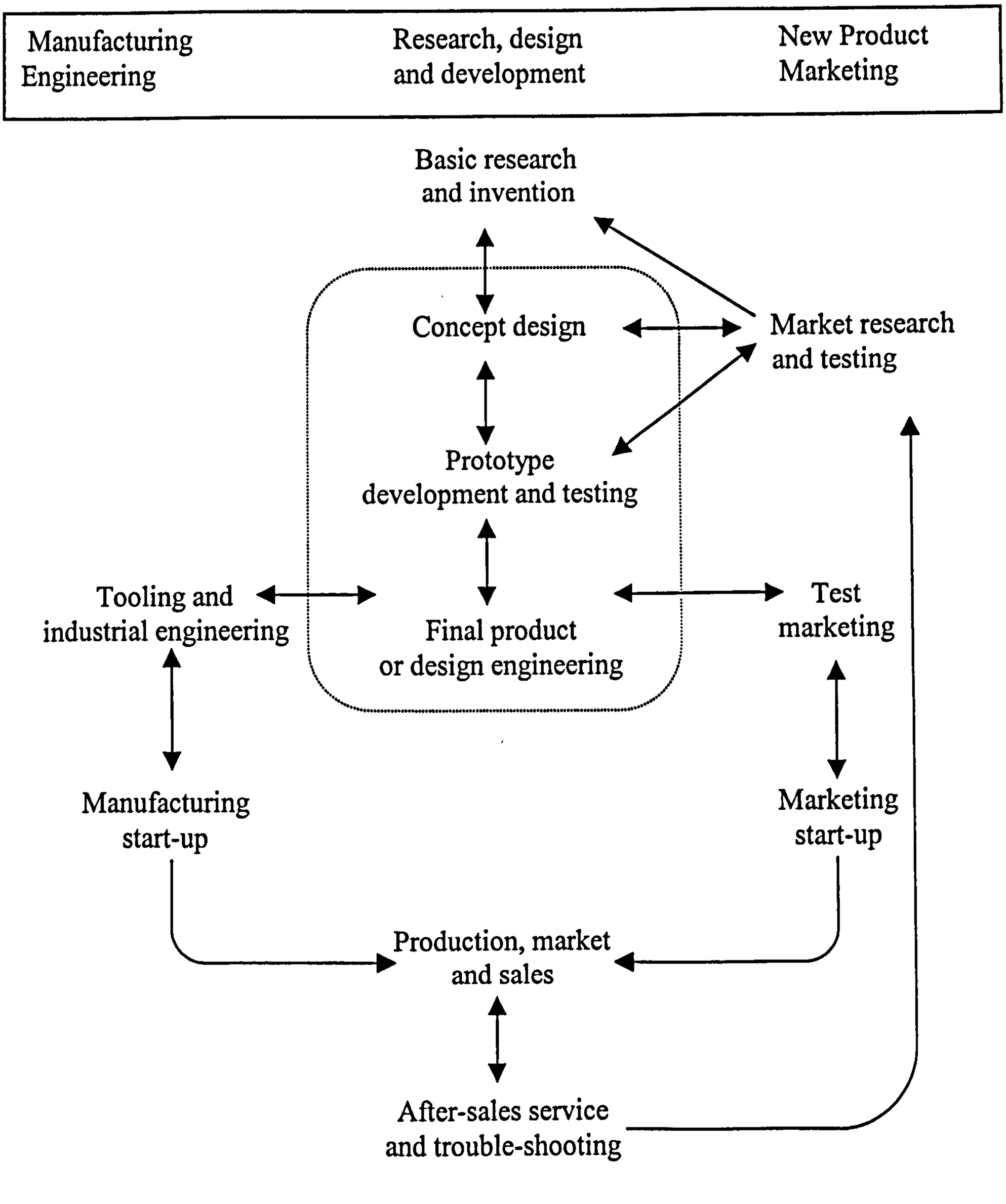

Figure 3. The process of technological innovation. Source: Ray and Bruce (1984)

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[1] Roy, R. & Wield, D. (1993) Product Design & Technological Innovation, Milton, p3

8.3 10 stages of a generic programme for product development: (Archer,1974) [2]

Strategic Planning

Stage1 Policy Formation

1. Establish strategic objectives
2. Lay down timetables, overall budgets & guide lines for innovation.

Research

Stage 2Preliminary Research (5-10% of total cost of a project)

1. Select an invention, discovery, scientific principle, product idea or technological base
2. Identify an area of need, marketing opening, consumer appetite, product deficiency or value base.
3. Establish the existing state of the art (library and market research)
4. Prepare outline performance specification (a verbal prescription for a proposed product – specification 1)
5. Identify probable critical problem areas.

Stage 3Feasibility Study (Out of ten product ideas emerging from this stage...)

1. Establish technical feasibility (basic calculations)
2. Establish financial viability (economic analysis)
3. Resolve critical problems in principle (inventions)
4. Propose outline of overall solution(s) (sketch designs 1)
5. Estimate work content of phases 4 & 5 & probability of a successful outcome (risk analysis)

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2 Archer, L.B. (1974) Design Awareness & Planned Creativity in Industry, Design & Conflicts of Interest, Chpt. 3, London: Office of Design, Department of Industry Trade & Commerce Ottawa, Design council of Great Britain, p46/47

Design (10-20% of total cost of a project)

Stage 4Design Development

1. Expand & quantify performance specification (specification 2)
2. Develop detailed design (design 2)
3. Predict technical performance and product costs
4. Prepare design documentation
5. Design technical evaluation experiments and user trials.

Stage 5Prototype development (...perhaps three go to prototype stage...)

1. Construct prototype(s), mock-ups (prototype 1)
2. Conduct bench experiments with prototypes
3. Evaluate technical performance.
4. Conduct user trials with prototypes (trials 1)
5. Evaluate performance in use.

Stage 6Trading Study

1. Re-appraise market potential in light of trials
2. Re-appraise costings
3. Appraise marketing/production problem
4. Revise basic objective (strategic planning and development budget)
5. Revise performance specification (specification 3)

Development (40-60% of total cost of project)

Stage 7Production Development (... and one survives for production development)

1. Develop a production design (design 3)
2. Execute production design documentation
3. Design technical, user and market trials
4. Construct pre-production prototypes (prototype 2)
5. Conduct technical, user & market field test (trials 2)
6. Appraise trials results & modify design

Stage 8Production Planning

1. Prepare marketing plans
2. Prepare production plans
3. Design packaging, promotional material, instruction manuals
4. Design jigs & tools

Manufacturing/ marketing start-up (Manufacturing start-up represents (say) 5-30 % of total cost of project. Marketing start-up represents (say) 5-15% of total cost of project)

Stage 9Tooling & Market Preparation

1. Construct jigs & tools
2. Construct trial batch of products off tools (prototype 3)
3. Test trial batch (trials 3)
4. Produce marketing machinery
5. Install production control machinery

Production

Stage 10 Production & Sale

1. Initiate marketing effort
2. Commence production & sale
3. Collect market, user repair & maintenance feedback
4. Make recommendations for second generation designs (stages 2 to 4)
5. Make recommendations for research (stages 1&2)

9. Introduction to postal seating user survey

The following questionnaire has had an initial pilot test and is ready to be evaluated before being circulated to regional groups of Young Arthritis Care, groups of people under the age of 45 years with arthritis.

9.1 Postal seating user survey

Lucy Poole at The University of Wolverhampton, Art & Design Department
Molineux Street, Wolverhampton, WV1 1SB
Tel: 0902 322935

Hello, I'm doing a survey to find out:

What kind of seating do younger people with arthritis want?

I am a member of Young Arthritis Care and I am designing a seat that is suitable for and attractive to young adults with arthritis, as part of my PhD. I trained in furniture design and I would like to put my ideas into practice, designing and making a seat that is based on current information from people who have experienced arthritis and are potential users of the seat.

Please return the questionnaire in the stamped addressed envelope provided by 12.12.95 for inclusion in the survey. You are welcome to remain anonymous, but if you are interested in participating in a design meeting or a trial of the seat design please enter your details at the end of the questionnaire.

Thank you for your time.

Regards Lucy Poole

Your information will be used for this project and it will be confidential.

Directions are written in italics.

1.0 Seating

1.1 What types of seats do you usually use? *Please tick most appropriate blanks*

office chair.....	dining chair.....	recliner.....
armchair.....	settee.....	rocking chair.....
bench.....	low stool.....	high stool.....
none of these.....	other.....	

1.2 Which is your favourite chair? *please describe.*

.....

1.3.1 Are there any types of seats that you avoid sitting in? *yes*..... *no*.....

1.3.2 *If yes, please describe the seat and say why.*

.....

1.4.1 Do you have a special, therapeutic chair? *yes*..... *no*.....

1.4.2 *If yes, please describe the seat and say why.*

1.4.3 *If yes:* did you buy it for yourself from a hi-st. shop *yes*.... *no*....
did you buy it for yourself from a catalogue *yes*.... *no*....
did you seek professional advice *yes*.... *no*....
was it given to you by social services *yes*.... *no*....
did social services advise that you buy it? *yes*.... *no*....
other.....

1.5 What seating arrangement do you have in your living room area?
Please tick the most appropriate blank(s)

Arm chair(s): one..... Settee(s): one seater.....
two..... two seater.....
three..... three seater.....
more..... more.....
Other seats, *please describe*.....

1.6 How many people normally sit down and relax, during leisure time, in your household? *Please tick the most appropriate blank(s)*

one..... two..... three.....
four..... five..... six.....
more, *please state*.....

1.7 When you are at home, what activities would you usually sit down to do? *please tick the relevant activities and include others.*

read books, magazine etc.,..... eat.....
write letters, diary etc..... drink.....
play games..... sew.....
watch television or video..... knit.....
listen to the radio..... talk.....
other.....

2.0 Design Ideas for the Seat

2.1 Which of the following features would you like to find on your domestic seat:
please select features and include others that are not listed. (cont. overleaf)

something to write on..... book rest.....
somewhere to put a cup..... light.....
somewhere to eat from..... storage.....
foot rest..... head rest.....
high back..... arms.....

seat slightly sloping backwards..... high seat.....

2.1 seat slightly tilting forwards..... low seat.....

cont. warming element..... wrap, i.e. rug.....

cooling element..... massager.....

other.....

2.2 If you could choose upholstery for a seat, would you prefer it to have:
please select features and include others that are not listed.

plain fabric..... matching your decor.....

patterned fabric..... bright and bold.....

textured fabric..... leather.....

removable covers..... subtle tones.....

loose cushions..... washable covers.....

other.....

2.3 In the space below please feel free to draw your own ideas for a seat that you would like to use:

3.0 About your arthritis

3.1 Which sort of arthritis do you have? *Please tick the most appropriate blank(s)*

rheumatoid..... osteo..... juvenile.....
spondylitis..... psoriatic..... poly.....
none of these..... don't know.....
other.....

3.2.1 How old were you when you were diagnosed as having arthritis?.....

3.2.2 How many years have you had arthritis?.....

3.4 Which part of the body is affected by your arthritis?
please put one tick if one knee is affected, and two ticks for both

hip(s) ..... knee(s)..... ankle(s)..... foot/feet.....
hand(s)..... elbow(s).....
neck..... shoulder(s)..... top of the back.....
middle back..... lower back..... other.....

3.5 Are there times in the day when your arthritis affects you more? *yes....* *no....*

3.5.2 *If yes, please tick the most appropriate blank(s)*

early morning..... mid morning..... mid day.....
mid afternoon..... late afternoon.....
early evening..... late evening..... mid night.....

3.6 If your joints ache, is it helpful to:

keep them: warm? yes..... no..... don't know.....
cool? yes..... no..... don't know.....
bent? yes..... no..... don't know.....
straight? yes..... no..... don't know.....
exercise? yes..... no..... don't know.....
go to bed? yes..... no..... don't know.....
sit down and relax yes..... no..... don't know.....
other .....

3.7 Do you use: *Please tick the appropriate blank(s)*

day splint(s)..... night splint(s)..... work splint(s).....
rest splint(s)..... stick(s)..... a wheelchair..... none of these..... other.....

Optional Statistics Age..... Sex..... Height..... Weight.....

When you have completed the questionnaire...

If you would like to test my seat design: *please enter your details below:*

name .....

contact address .....

telephone no. .....

Please feel free to contact me if you would like to know more about the project.

Lucy Poole

9.1.1 Raw data as from MS Excel document

The following tables are selected answers from the Postal Survey carried out with members of Young Arthritis Care. (for more information please appendices to thesis)

The selective results and raw data is tabulated as it was entered into SPSS.

9.1.1.1 What types of seats do you usually use?

Respondents 1-15

office chair	armchair	bench	none of these	dining chair	settee	low stool	recliner	rocker	High stool
.	y	.	.	y	y	.	.	.	.
.	.	.	.	.	.	.	.	.	.
.	y	.	.	y	y	.	.	.	.
.	.	.	.	y	.	y	.	.	.
.	.	.	.	y	.	y	.	.	.
y	y	.	.	.	.	.	.	.	.
y	.	.		y	y	.	.	.	.
.	.	.	.	y	y	.	y	.	y
y	.	.	.	.	.	.	.	.	.
.	y	.	.	y	.	.	.	.	.
y	y	.	.	y	y	.	.	.	.
y	.	.	.	y	y	.	.	.	.
y	y	.	.	.	y	.	.	.	.
y	y	.	.	.	y	.	.	.	.
.	y	.	.	.	y	.	.	.	.

Respondents 16-29

office chair	armchair	bench	none of these	dinning chair	settee	low stool	recliner	rocker	High stool
y	y		.	y	.	.	.	.	.
.	y	.	.	.	.	.	.	.	y
y	.	.	.	.	y	.	.	.	.
.	y	.	.	.	y	.	.	.	.
y	.	.	.	.	y	.	.	.	.
.	y	.	.	.	.	.	.	.	.
.	y	.	.	.	.	.	.	.	y
.	y	.	.	y	y	.	.	.	.
.	y	.	.	.	.	.	.	.	.
.	y	.	.	.	.	.	.	.	.
y	y	.	.	.	y	.	.	.	y
.	y	.	.	.	.	.	.	.	.
.	.	.	.	y	.	.	y	.	.

Respondents 30-42

office chair	armchair	bench	none of these	dinning chair	settee	low stool	recliner	rocker	High stool
.	y	.	.	y	.	.	.	.	.
Y	.	.	.	Y	Y	.	.	.	.
y	y	.	.	y	.	.	y	.	.
y	y	.	.	.	y	.	.	.	.
y	.	.	.	y	y		.	.	.
	.	.	.	y	.	.	y	.	.
y	y	.	.			.	.	.	.
y		.	.	y	y	.	.	.	.
.	y	.	.	y	.	.	.	.	.
.	y	.	.	.	.	.	.	.	.
.	y	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.

Respondents 43-52

office chair	armchair	bench	none of these	dinning chair	settee	low stool	recliner	rocker	High stool
.	.	.	.	y	.	.	.	.	.
.	y	.	.	.	y	.	.	.	.
y	.	.	.	y	y	.	.	.	.
.	y	.	.	.	.	.	.	.	.
y	.	.	.	.	.	.	y	.	.
.	y	.	.	.	y	.	y	.	.
.	.	.	.	y	y	y	.	.	.
y	.	.	.	y	y	.	.	.	.
y	.	.	.	.	.	.	y	.	y

9.1.1.2 Are there any types of seats that you avoided / Do you have a therapeutic chair?

Respondents 1-15

avoid y/n?	special chair
y	n
y	n
y	n
y	n
y	n
y	n
y	y
y	n
y	n
y	n
y	n
y	n
y	n

Respondents 16-29

avoid y/n?	special chair
y	n
y	n
n	n
y	n
y	y
y	y
y	.
n	n
y	n
y	n
y	n
y	n
y	y
y	n

Respondents 30-42

avoid y/n?	special chair
y	n
Y	n
y	y
y	y
y	n
y	n
y	y
y	n
y	n
y	n
y	n
y	n
.	.

Respondents 43-52

avoid y/n?	special chair
y	n
y	y
y	n
y	n
y	n
n	n
y	n
y	n
.	.

9.1.1.3 Source of therapeutic chair

Respondents 1-15

soc ser advice	given by soc ser	prof advice	catalogue	high st shop
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	y	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.

Respondents 16-29

soc ser advice	given by soc ser	prof advice	catalogue	high st shop
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
y	.	.	.	.
y	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	y	.	.	.
.	.	.	.	.

Respondents 30-42

soc ser advice	given by soc ser	prof advice	catalogue	high st shop
.	.	.	.	.
.	.	.	.	.
.	.	.	.	y
.	y	.	.	.
.	.	.	.	.
.	y	y	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.

Respondents 43-52

soc ser advice	given by soc ser	prof advice	catalogue	high st shop
.	.	.	.	.
.	y	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.

9.1.1.4 Number of seats & sitters

Respondents 1-15

No of armchairs	size of biggest	max No sitting
2	3	3
.	2	.
2	3	4
2	3	2
2	3	2
	3	3
2	3	3
2	3	5
3	2	2
1	2	2
2	2	2
2	3	2
1	3	3
2	3	2

Respondents 16-29

No of armchairs	size of biggest	max No sitting
2	3	2
2	3	2
2	3	4
1	3	2
1	3	1
1	.	3
2	2	2
2	2	4
1	3	1
2	3	2
2		4
2	2	4
2	3	2

Respondent 30-43

No of armchairs	size of biggest	max No sitting
2	3	2
2	3	2
.	.	3
2	3	2
1	3	4
2	3	2
2	3	2
.	2	3
2	3	3
2	3	4
1	3	2
.	.	.

Respondents 43-52

No of armchairs	size of biggest	max No sitting
4	3	2
2	2	1
1	3	2
1	2	3
1	0	3
1	3	6
.	3	2
2	3	4
2	3	2

9.1.1.5 What seated activities do you usually do?

Respondents 1-15

some... writing	somewhere cup	somewhere eat	foot rest	high back	slope backwards	book rest	light	storage	head rest	arms	high seat	tilt forwards	warming	cooling	Low seat	wrap	massager
.	y	y	y	.	y	.	.	.	y	y	.	.	y	.	.	.	.
y	y	.	y	.	y	y	.	.	.	y	.	.	.	.	.	.	.
y	y	y	y	y	.	.	.	.	.	y	.	.	.	.	y	.	.
y	y		.	.	.	y	y	.	.	y	.	.	.	.	.	.	y
y	y	.	.	y	.	.	.	.	y	.	y	.	.	.	.	.	.
.	y	.	.	.	y	.	.	.	y	.	.	.	.	.	.	.	.
.	y	y	.	y	.	.	.	.	y	y	y	.	.	.	.	.	.
y	y	.	y	y	.	.	.	.	.	y	y	.	.	.	.	.	.
.	.	.	.	y	.	.	.	.	y	y	y	.	.	.	.	.	.
.	y	y	.	y	.	.	.	.	y	y	y	.	.	.	.	.	.
.	.	y	y	y	.	.	.	.	y	.	y	.	.	.	.	.	.
.	y	.	y	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	y	.	y	.	y	y	.	.	.	.	.	.	y	.	.
.	y	.	.	y	.	y	.	.	y	y	y	.	.	.	.	.	.

read	write	games	TV	radio	eat	drink	sew	knit	talk
y	.	.	y	.	y	y	.	.	y
.	.	.	.	.	.	.	.	.	.
y	.	.	y	.	y	y	y	y	.
y	y	.	y	.	y	y	y	y	.
y	y	y	y	.	y	.	.	.	y
y	y	.	y	y	y	y		y	y
y	y	.	y	y	y	.	.	.	y
y	y	y	y	.	y	y	.	.	y
y	y	.	y	.	y	.	y	.	.
y	y	.	y	.	y	y	.	.	y
y	y	y	y	y	y	y		.	y
y	.	.	y	.	.	.	y	y	y
y	.	.	y	.	y	y	.	.	y

Respondents 16-29

some... writing	somewhere cup	somewhere eat	foot rest	high back	slope backwards	book rest	light	storage	head rest	arms	high seat	tilt forwards	warming	cooling	low seat	wrap	massager
.	y	.	.	.	.	.	.	.	y	y	y	.	.	.	.	.	.
y	.	.	y	.	.	y	.	.	.	y	y	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	y	.	.	.	y	.	.	.	y
.	y	.	y	.	y	.	.	.	y	.	.	.	y	.		.	y
.	.	.	.	y	.	.	.	.	.	y	y	.	y	.	.	.	.
y	y	y	y	y	.	y	y	y	y	y	y	.	y	.	.	.	y
y		y	y	y		y	.	.	y	y	y	y	.	.	.	.	.
.	y	.	y	.	y	.	.	.	.	y	.	.	.	.	.	.	.
y	.	.	y	y	.	.	.	.	y	y	y	.	y	.	.	.	.
y	y	y	.	.	.	y	.	.	.	.	y	.	y		.	.	.
.	y	.	.	y	.	.	.	.	y	y	y	y	.	.	.	.	.
.	y	y	y	y	.	y	.	.	y	y	y	y	y	.	.	.	.
.	.	y	.	y	.	.	.	.	y	y	y	.	.	.	.	.	.

talk	knit	sew	drink	eat	radio	tv	games	write	read
y	.	.	y	y	y	y	.	y	y
y	.	.	.	.	y	y	.	.	.
y	.	.	y	.	y	y	.	.	y
.	.	.	y	.	y	y	.	.	y
y	.	.	y	y	y	y	.	y	y
y		y	y	y	y	y	y	y	y
y	.	.	y	.	y	y	.	.	y
y	.	y	y	y	y	y	y	y	y
y	y	.	y	y	y	y		y	y
y	y	y	y	y	y	y	y	y	y
y	.	.	y	y	y	y	.	.	y
y	.	.	y	y	y	y	.	.	y
y	.	.	y	y	y	y	.	.	y

Respondents 30-42

talk	knit	sew	drink	eat	radio	tv	games	write	read
y	y	y	y	y	.	y	.	.	y
y	.	Y	Y	Y	Y	Y	Y	Y	Y
y	.	y	y	y	y	y	.	y	y
.	.	.	y	y	y	y	.	y	y
y	y	y	y	y	y	y	y	y	y
y	.	.	y	y	.	y	.	y	y
y	y	y	y	y	y	y	y	y	
y	y	y	y	y	y	y	y	y	y
y	y	y	y	.	y	y	y	.	y
y	y	y	y	.	y	y	.	.	y
y	y	.	y	.	y	y	.	.	y
.	.	.	.	.	.	.	.	.	.

massager	wrap	Low seat	cooling	warming	tilt forwards	high seat	arms	head rest	storage	light	book rest	slope backwards	high back	foot rest	somewhere eat	somewhere cup	some...writing
.	.	.	.	y	.	y	y	y	.	.	.	y	y	y	.	y	y
Y	.	.	.	.	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y
.	.	.	.	.	y	y	y	y	y	.	.	y	y	y	.	.	.
.	.	y	.	.	.	.	y	y	y	.	y	y	.	y	y	y	y
.	.	.	.	y	y	.	.	.	.	.	.	y	y	.	y	y	y
.	.	.	.	.	.	.	y	.	y	.	y	.	y	y	.	y	.
.	.	.	.	.	.	.	.		.	.		.			.	.	.
.	.	.	.	.	.	.	y	y	y	.	y	.	y	y	.	.	.
.	.	.	.	.	.	y	y	y	.	.	.	y	y	y	.	y	.
.	.	.	.	.	.	y	y	y	.	.	.	y	y	y	.	y	.
.	.	.	.	.	.	.	y		.	.	.			y	.	y	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Respondents 43-52

read	write	games	tv	radio	eat	drink	sew	knit	talk
y	y	y	y	y	y	y	y	.	y
y	y	.	y	y	y	y		.	y
y	y	y	y	.	y	y	.	.	y
y	.	y	y	.	y	y	.	.	.
y	y	.	y	.	y	y	y	.	y
y	y	y	y	y	y	y	.	.	y
y	.	.	y	.	y	y	.	.	.
y	.	.	y	.	y	.	.	y	y
y	y	y	y	y	y	y	.	.	y

Somethi. writing	somewhere cup	somewhere eat	foot rest	high back	slope backwards	book rest	light	storage	head rest	arms	high seat	tilt forwards	warming	cooling	Low seat	wrap	massager
.	y	.	y	y	y	.	y	y	y	y	y	.	y	.	.	y	.
.	y	y	.	y	.	.	.	.	.	y	y	.	.	.	.	.	.
y	y	.	y	y	y	.	.	.	.	y	y	.	.	.	.	.	y
.	.	.	.	y	.	.	y	.	.	y	y	.	.	.	.	.	.
.	y	.	.	y	.	.	.	.	.	.	y	.	.	.	.	.	.
y	y	y	y	y	.	y	.	.	y	.	y	.	.	.	.	.	.
.	y	.	y	y	.	.	.	.	y	y	.	.	.	.	.	.	.
y	y	.	y	.	.	y	.	.	.	y	y	.	y	.	.	.	y
y	y	.	.	.	.	y	.	.	.	.	.	.	.	.	.	.	.

9.1.1.6 Upholstery preferences

Respondents 1-15

plain fabric	patterned	textured	removable	loose (cushion)	match decor	bright bold	leather	subtle	washable
.	y	.	y	y	y	.	.	.	y
.	.	.	.	y	.	.	.	.	.
y	.	.	.	.	y	.	.	.	y
.	y	.	.	y		.	.	.	.
.	.	.	.	.	y	.	.	.	.
y	.	.	y	.	.	.	y	.	y
.	.	y	y	y	.	.	.	y	y
y	.	y	.	y	.	.	.	.	.
y	.	.	.	.	y	.	.	y	y
.	.	.	y	y	y	.	.	.	y
.	.	y	.	.	.	.	.	.	y
.	.	.	.	.	.	.	.	.	.
.	.	.	y	.	.	.	.	.	y
y	.	.	y	.	.	.	.	.	y

Respondents 16-29

plain fabric	patterned	textured	removable	loose (cushion)	match decor	bright bold	leather	subtle	washable
.	y	y	.	.	.	.	.	.	.
.	.	.	y	.	.	.	.	y	y
.	.	.	.	.	y	.	.	y	.
.	y	.	y	.	.	.	.	y	y
.	.	.	y	y	y	.	.	.	y
.	.	.	.	.	y	.	.	.	.
.	y	y	y	.	y	.		y	y
.	y	.	.	y	.	y	.	.	.
.	y	.	y	.	y	.	.	.	y
.	.	.	y	.	.	.	.	.	y
.	y	.	.	.	y	.	.	y	y
.	.	y	.	.	.	.	.	.	y
.	.	.	.	.	y	.	.	.	.

Respondents 30-42

plain fabric	patterned	textured	removable	loose (cushion)	match decor	bright bold	leather	subtle	washable
y	.	.	y	.	y	.	.	y	y
.	Y	Y	Y	Y	Y	.	Y	Y	Y
.	.	y	.	.	.	.	.	y	.
.	.	y	y	.	y	.	.	.	y
.	.	.	y	y	y	.	.	.	.
.	.	.	.	y	y	.	.	.	.
y		.	.			.	.	.	.
.	y	.	.	y	y	.	.	.	.
.	.	.	.	y	y	.	.	.	y
.	y	.	y	.	y	.	.	.	y
.	.	.	y	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.

Respondents 43-52

plain fabric	patterned	textured	removable	loose (cushion)	match decor	bright bold	leather	subtle	washable
.	y	.	y	y	y	y	.	.	y
.	.	.	y	y	.	.	.	.	y
y	.	.		.	y	.	y	.	.
y	.	.	.	.	.	.	.	.	.
.	.	.	.	.	y	.	.	.	y
.	.	.	.	y	.	.	y	.	.
y	.	.	y	.	y	.	.	y	.
.	.	.	y	.	.	.	.	y	y
.	.	.	y	.	y	.	.	.	y

9.1.1.7 Part/s of the body affected by arthritis

Respondents 1-15

one of r s n o p j y	daig age	years	hips	foot	neck	middle back	knees	hands	shoulders	lower back	ankle	elbow	top back
r	20	.	y	y	y	y	y	y	y	y	y	y	y
0	21	23	y	.	y	y	y	y	y	y	.	y	y
2	23	17	y	y	y	y	y	y	y	y		y	y
0	35	3	y	.	y	y	.	.	.	y	.		
0	39	4	.	.	y	.	.	.	.	y	.	.	.
0	40	10	y	.	.	.	y	y	.	y	y	.	.
0	38	7	.	.	.	.	.	.	.	y	.	.	.
2	42	4	.	.	y	y	.	.	y	.	.	.	y
j	2	47	y	y	y	.	y	y	y	.	y	y	.
2	32	20	.	y	.	y	y	.	.	y	y	.	.
R	21	12	.	y	y	.	y	y	y	.	y	.	.
R	5	19	y	y	y	y	y	y	y	y	y	y	y
0	36	4	y	.	.	.	y	.	.	.	y	.	.
R	39	5	.	y	y	.	y	y	y	.	.	y	y

Respondents 16-29

one of r s n o p j y	daig age	years	hips	foot	neck	middle back	knees	hands	shoulders	lower back	ankle	elbow	top back
R	35	16	.	y	y	y	y	y	y	.	y	y	.
R	27	18	y	y	y	.	y	y	.	y	y	.	.
R	35	2	.	.	y	.		y	.	y	y	.	.
2	25	10	.	y	y	.	y	.	y	y	.	y	.
0	33	4		.	y	y	y	.	y	y	.	.	y
0	33	13	y	y	y	.	y	y	y	y	y	.	.
R	20	13	.	y	y	.	y	y	y	.	.	.	y
2	11	7	y	y	y	.	y	y	y	.	y	y	.
0	28	5	y	y	y	.	y	y	.	y	y	.	y
2	13	5	y	y	y	.	y	y	y	.	y	y	.
2	38	6	y	y	y	.	y	y	.	y	y	.	.
2	25	15	y	y	.	.	y	y	.	.	y	.	.
R	40	3	y	y	y	.	y	y	y	.	y	y	.

Respondents 30-42

one of r s n o p j y	daig age	years	hips	foot	neck	middle back	knees	hands	shoulders	lower back	ankle	elbow	top back
2	30	5	.	.	y	.	y	y	y	y	.	y	.
2	41	25	Y	Y	Y	.		Y	Y	Y	Y	.	Y
S	29	12	y	y	y	.	y	y	.	y	y	.	y
2	30	13	y	y	y	y	y	y	y	y	y	y	y
0	30	7	.	.	.	y	.	.	.	y	.	.	.
J	3	27	y	y	y	y	y	y	y	y	y	y	y
S	20	32	y	y	y	.	y	y	y	y	y	.	y
R	30	3	.	y	y	.	y	y	.	y	y	.	.
R	39	9	y	y	y	.	y	y	y	.	y	y	.
2	28	16	.	y		.	y	y	.	.	y	.	.
R	38	10	.	y	.	.	y	y	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.

Respondents 43-52

one of r s n o p j y	daig age	years	hips	foot	neck	middle back	knees	hands	shoulders	lower back	ankle	elbow	top back
R	36	5	y	y	.	.	y	y	.	y	y	.	.
R	30	7	.	y	y	.	y	y	.	.	y	y	.
R	27	4	y	y	y	.	y	y	y	.	y	y	.
.	12	3	y	.	.	.	y	.	.	.	.	.	.
R	16	18	.	y	.	.	y	y	y	.	y	y	.
2	29	6	y	y	y	y		y	.	y	y	.	y
R	29	4	.	y	.	.	y	y	.	.	y	.	.
R	22	16	.	y	.	.	y	y	.	y	y	.	.
2	25	12	y	.	y	.		y	y	y	.	.	y

9.1.1.8 Arthritis affected by time of day?

Respondents 1-15

early am	mid am	mid day	mid pm	late pm	early evening	late evening	mid night
y	.	.	.	.	y	y	.
y	.	.	.		y	y	y
y	.	.		y	.	.	y
y	.	.	.	.	y	y	.
.	.	.	.	.	.	.	.
y	.	.	.	y	.	.	.
y	.	.	y	.	.	y	.
.	.	.	.	.	.	.	.
y	.	.	.	.	.	.	.
y	.	.	.	.	.	.	.
y	.	.	.	.	.	.	.
y	.	.	.	.	.	y	.
.	.	.	.	.	.	.	.
y	.	.	.	.		y	.

Respondents 16-29

early am	mid am	mid day	mid pm	late pm	early evening	late evening	mid night
.	.	.	.	.	.	.	y
y	.	.	.	.	y	y	y
y	.	.	.	.		y	.
y	.	.	.	.	y	y	y
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
y	.	.	.	y	.	.	y
y	.	.	.	.		y	.
y	.	.	.	y	.	.	y
y	.	.	.	.	.	y	.
y	.	.	.	.	y	.	.
y	.	.	.	.	y	y	.
y	.	.	.	.	.	y	.

Respondents30-42

early am	mid am	mid day	mid pm	late pm	early evening	late evening	mid night
y	.	.	.	y	.	y	y
Y	Y	Y	Y	Y	Y	Y	.
y	.	.	.	y	y	y	.
y	.	.	.	.	y	y	y
y	.	.	y	.	.	y	.
y	.	.	.	.	.	y	y
.	.	.	.	.	.	.	.
y	.	.	.	.		y	y
y	.	.	.	y	.	y	.
y	.	.	.	.	.	y	.
y	.	.	.	.	.	y	.
.	.	.	.	.	.	.	.

Respondents 43-52

early am	mid am	mid day	mid pm	late pm	early evening	late evening	mid night
y	.	.	.	y	y	y	y
y	.	.	.	y	y	y	y
y	y	.	.	y	y	y	.
y	.	.	.	.	.	.	.
y	.	.	.	.	.	y	.
y	.	y	y	.	y	.	y
y	.	.	.	.	.	.	.
	.	.	.	y	y	y	.
y	.	.	.	.	y	.	.

9.1.1.9 When joints ache, do you....

Respondents 1-15

warm y/n	cool y/n	bent y/n	straight y/n	exercise y/n	go to bed y/n	sit down y/n
y	.	.	.	.	.	y
y	.	.	y	.	.	.
y	.	.	.	y	y	y
.	y	.	y	.	y	y
y	n	n	y	y	y	n
y	n	n	y	y	n	n
y	n	.	.	n	y	y
y	n	n	n	y	y	y
y	.	.	.	.	y	y
y	n	n	n	y	y	y
y	y	.	y	y	y	y
y	y	.	.	y	y	y
y	.	.	.	y	.	.
.	y	.	.	y	.	y

Respondents16-29

warm y/n	cool y/n	bent y/n	straight y/n	exercise y/n	go to bed y/n	sit down y/n
.	.	.	.	.	.	.
y	.	.	.	y	.	y
y	.	.	.	.	.	y
y	.	.	.	y	y	y
y	y	.	.	n	.	y
y	.	.	.	y	y	y
y	.	.	.	.	.	y
y	.	n	n	y	n	y
y	.	y	n	n	y	y
y	.	.	.	.	y	y
y	n	n	y	n	y	y
y	n	n	y	n	y	y
y	.	.	y	.	y	.

Respondents30-42

warm y/n	cool y/n	bent y/n	straight y/n	exercise y/n	go to bed y/n	sit down y/n
y	.	.	.	.	y	y
Y	.	.	.	Y	.	Y
y	.	n	y	y	.	y
y	.	y	y	y	n	n
y	.	.	y	.	y	y
y	y	y	y	y	y	y
y	.	.	.	.	.	.
y	n	.	.	y	y	y
y	.	y	.	n	y	y
y	n	.	.	n	n	y
y	.	.	y	.	y	y
.	.	.	.	.	.	.

Respondents 43-52

warm y/n	cool y/n	bent y/n	straight y/n	exercise y/n	go to bed y/n	sit down y/n
y	y	y	y	y	y	y
y	.	.	.	.	.	.
y	y	y	y	n	y	y
y	.	.	y	.	.	.
y	.	.	.	.		y
y	.	.	.	y	y	y
y	n	y	n	n	y	y
y	.	.	y	.	y	y
y	n	y	n	.	.	.

9.1.1.10 Do you use...

Respondents 1-15

day splint	rest splint	none	night splint	stick	work	wheelchair
y	.	.	.	y	.	y
y	.	.	.	y	.	y
.	.	.	.	y	.	y
.	.	.	.	.	.	.
.	.	.	.	.	.	.
	.	.	.	.	.	.
.	.	.	.	y	.	.
.	.	.	.	y	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
y	y	.	y	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
y	.	.	y	.	y	.

Respondents 16-29

day splint	rest splint	none	night splint	stick	work	wheelchair
.	.	.	.	.	.	.
y	y	.	y	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	y	.	y	.
y	.	.	y	.	.	.
.	.	.	.	.	.	y
.	y	.	y	.	.	.
y	.	.	.	.	y	.
y	.	.	y	y	.	y
.	.	.	y	y	y	y

Respondents 30-42

day splint	rest splint	none	night splint	stick	work	wheelchair
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	y	y	y	y
.	.	.	.	y	.	y
.	.	.	.	.	.	.
.	y		y	y	.	y
.	.	.	.	.	.	.
.	.	.	.	.	.	.
y	.	.	y	y	.	y
y	y	.	.	.	y	.
.	.	.	.	.	.	.
.	y		.	.	.	.

Respondents 43-52

day splint	rest splint	none	night splint	stick	work	wheelchair
.	.	.	.	y	.	.
y	y	.	y	y	y	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	y	.
y	y	.	y	y	.	y
.	.	.	.	.	.	.
.	.	.	y	y	.	y
y	.	.	.	y	.	y

9.1.1.11 Age, Sex, Height & Weight

Respondents 1-15

age	sex m/f	height feet	height inches	weight stone	weight pounds
45	f	5	2	8	10
43	m	5	2	.	.
40	f	4	11	13	0
38	m	5	7	14	0
43	f	6	1	15	0
40	f	5	7	9	0
45	f	5	5	11	0
46	m	5	0	11	0
49	f	5	4	9	8
52	f	5	5	9	8
32	f	5	5	9	8
24	f	5	6	7	3
40	f	5	6	11	2
44	f	5	2	7	0

Respondents 16-29

age	sex m/f	height feet	height inches	weight stone	weight pounds
51	f	5	5	8	4
45	f	5	5	13	7
37	f	5	2	9	8
34	m	6	0	13	8
37	f	5	2	10	8
46	f	5	6	9	0
33	f	5	7	8	0
14	f	5	3	9	0
33	f	5	5	15	0
47	f	5	10	14	10
44	f	5	4	15	0
39	f	5	6	14	10
43	f	5	0	8	6

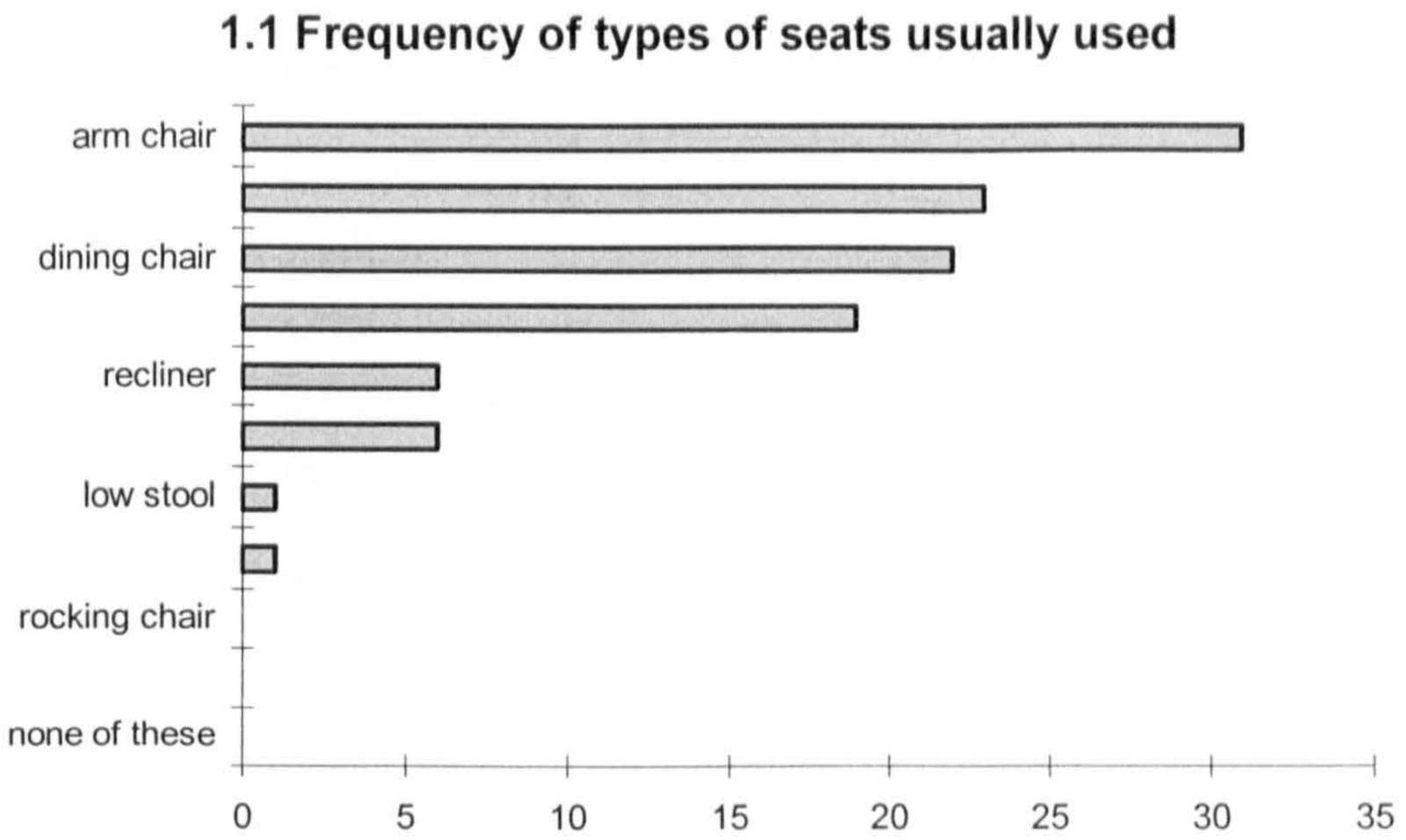
Respondent 30-42

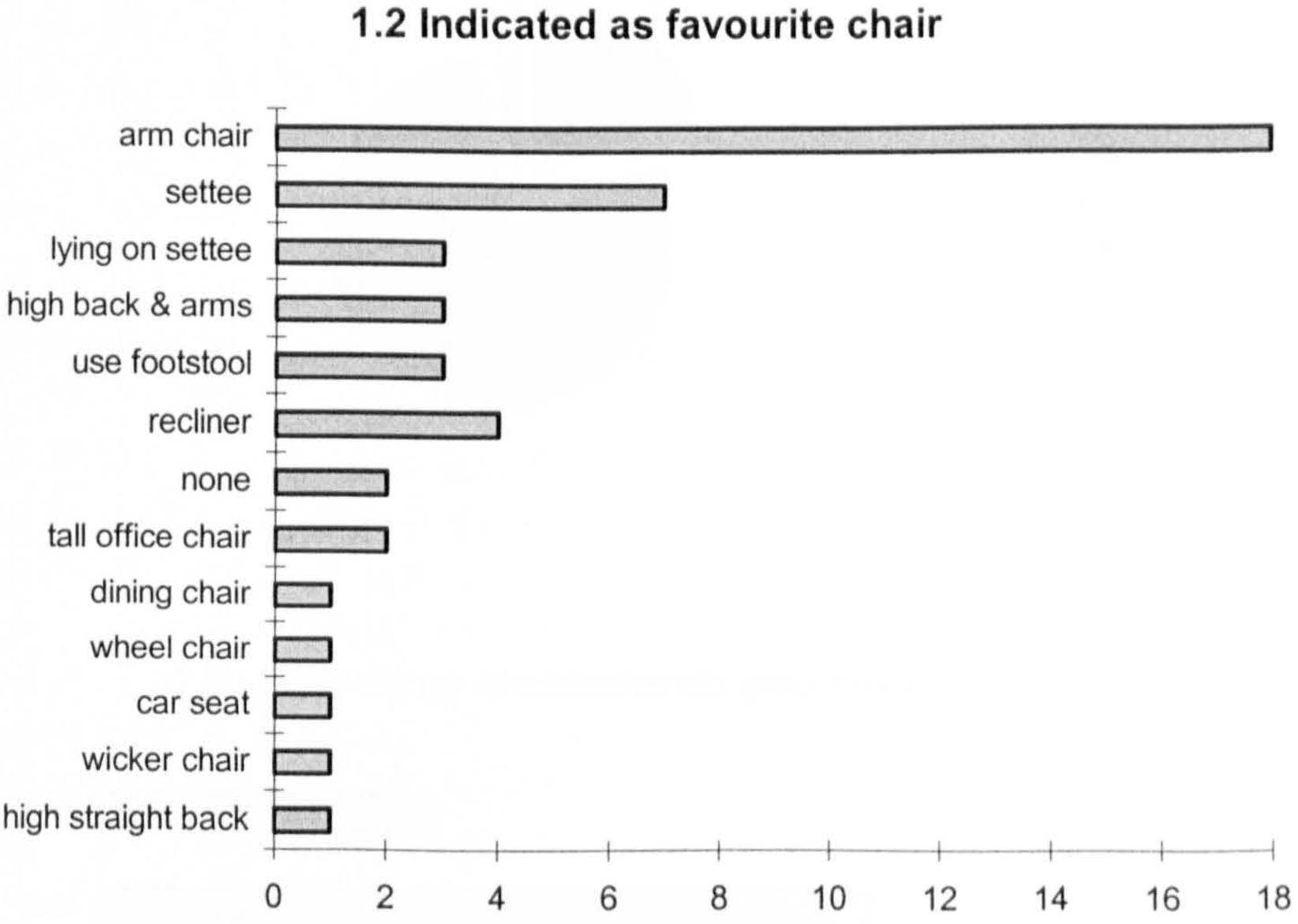
age	sex m/f	height feet	height inches	weight stone	weight pounds
35	f	5	5	10	0
54	f	5	0	8	7
31	f	5	4	7	3
43	f	5	0	9	7
36	f	5	9	9	5
30	f	5	5	8	0
52	f	5	3	9	0
33	f	5	2	8	7
48	f	5	9	10	0
44	f	5	5	9	4
.	.	.	.	.	.
48	f	5	2	15	0

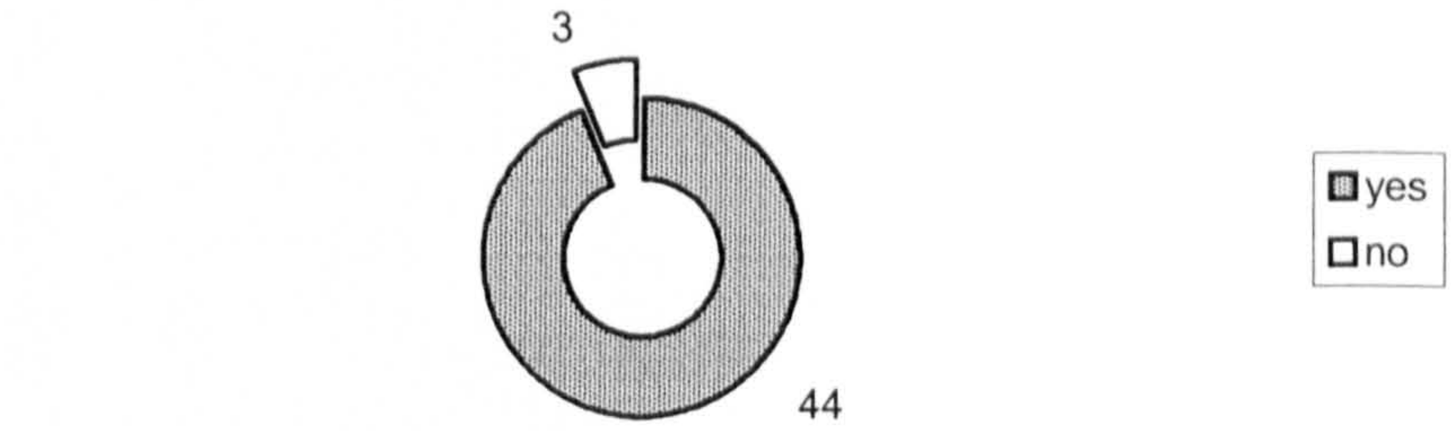
Respondents 43-52

age	sex m/f	height feet	height inches	weight stone	weight pounds
41	f	5	7	15	0
37	f	5	6	9	10
31	f	5	10	10	7
15	m	6	0	.	.
34	f	5	8	11	7
35	f	5	0	8	4
33	m	5	8	11	7
38	f	5	2	11	0
37	m	5	11	11	.

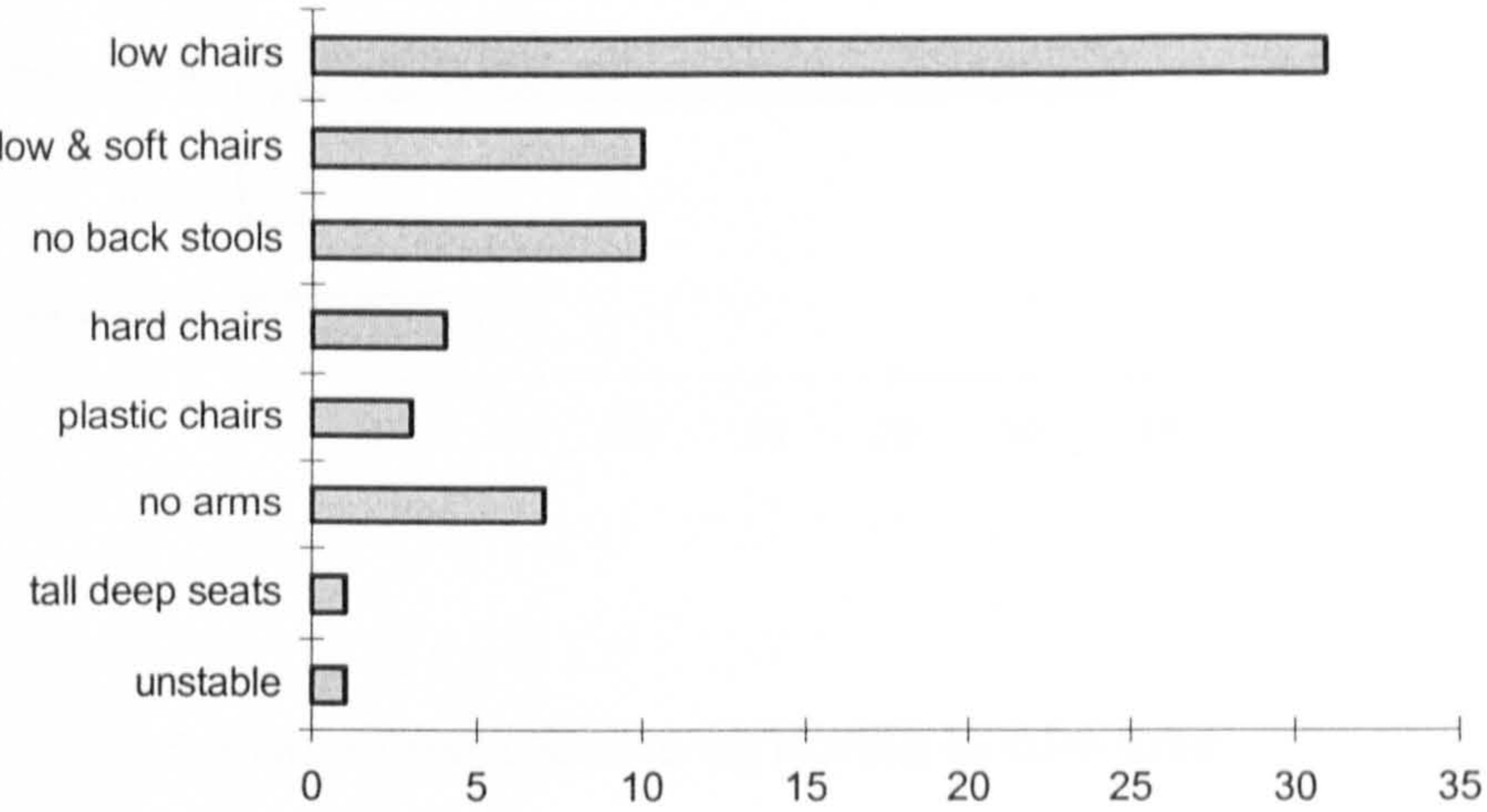
9.2 Charted results of postal seating user survey



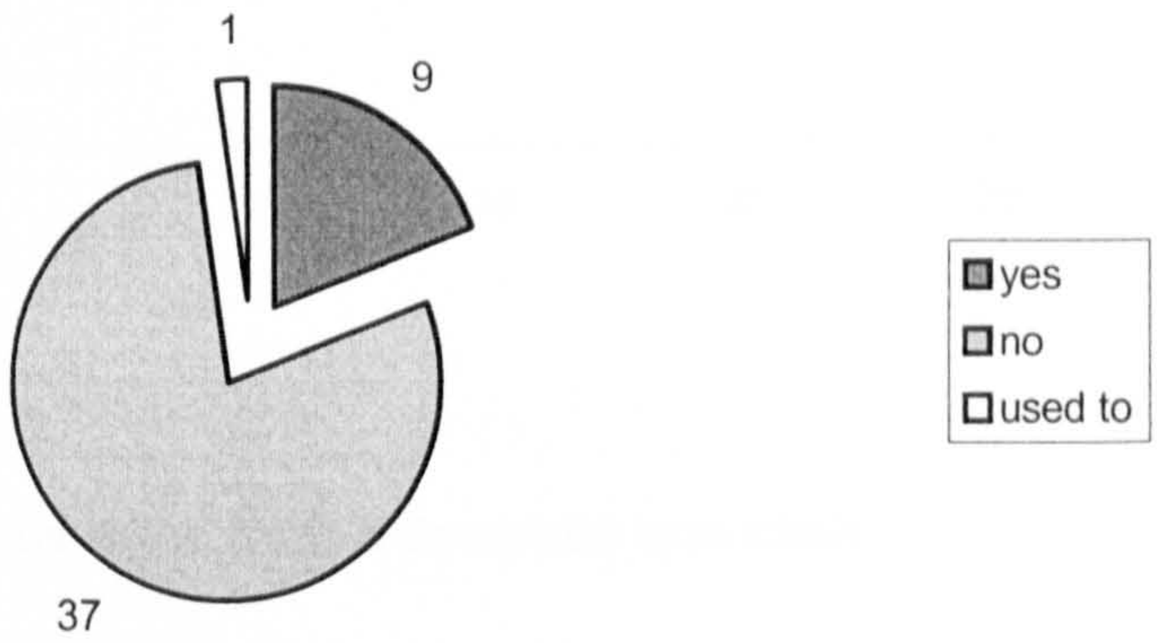




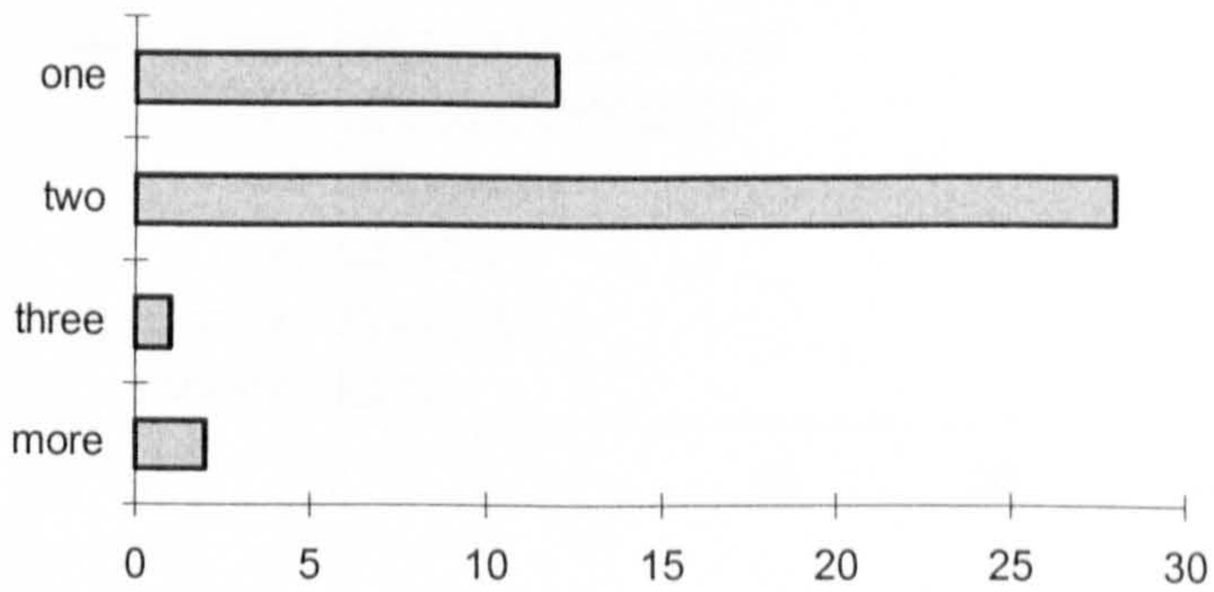
1.3.1 Type of chairs which are avoided



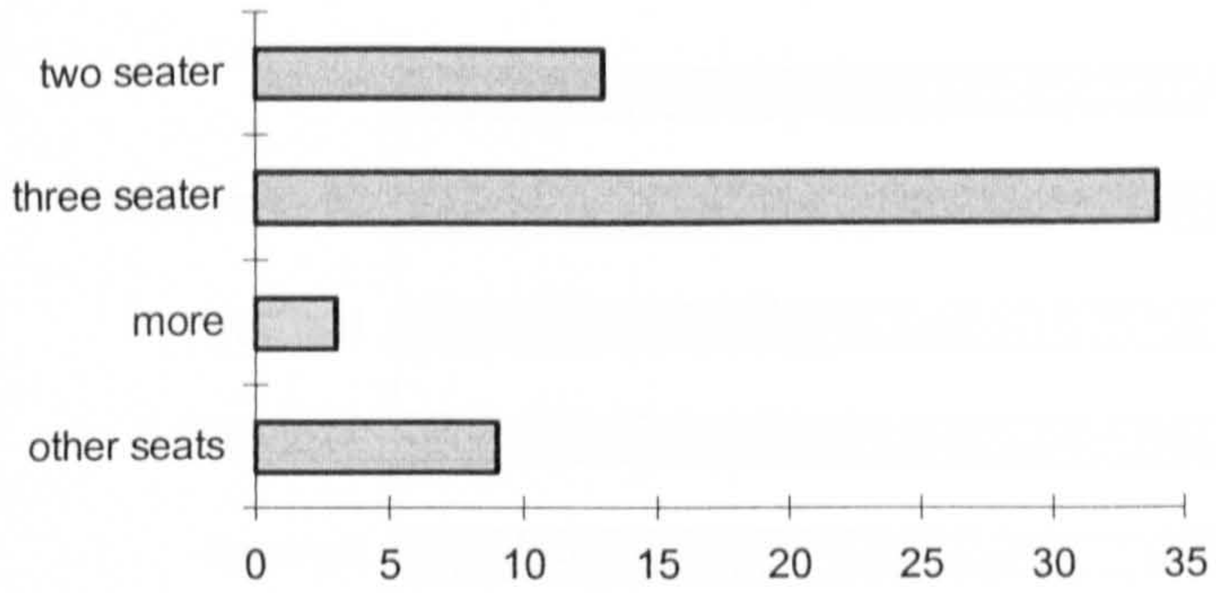
1.4.1 Do you use a therapeutic chair?



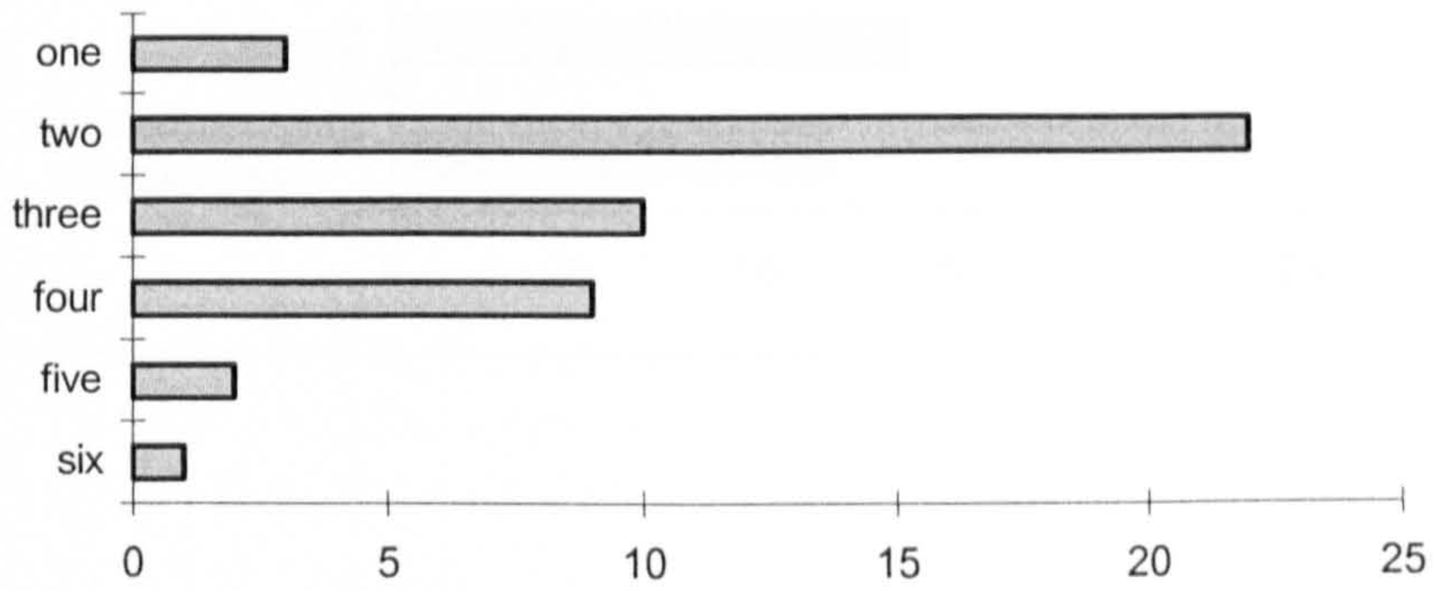
1.5a How many armchairs do you have?



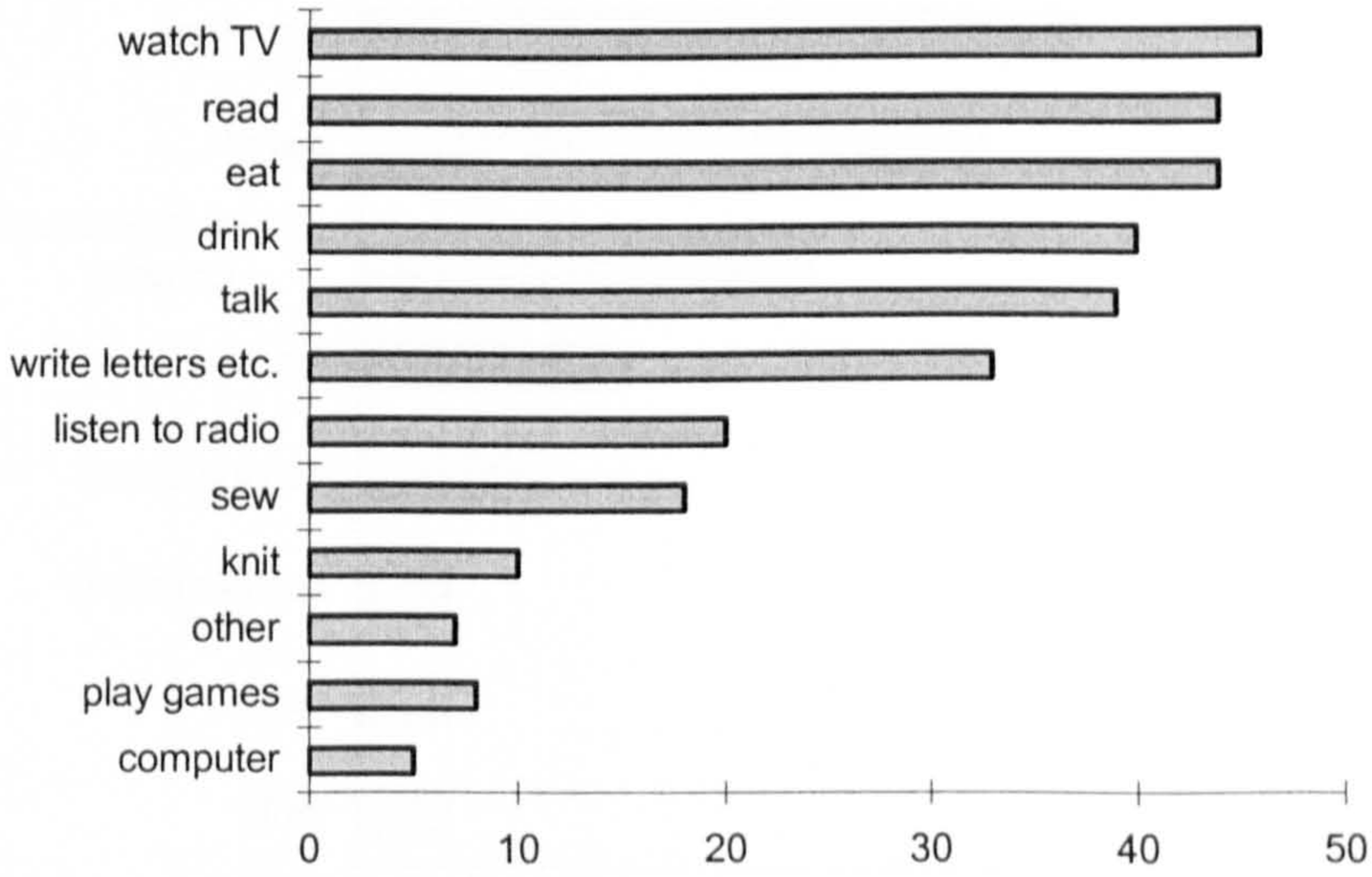
1.5b Other seating arrangements: settees

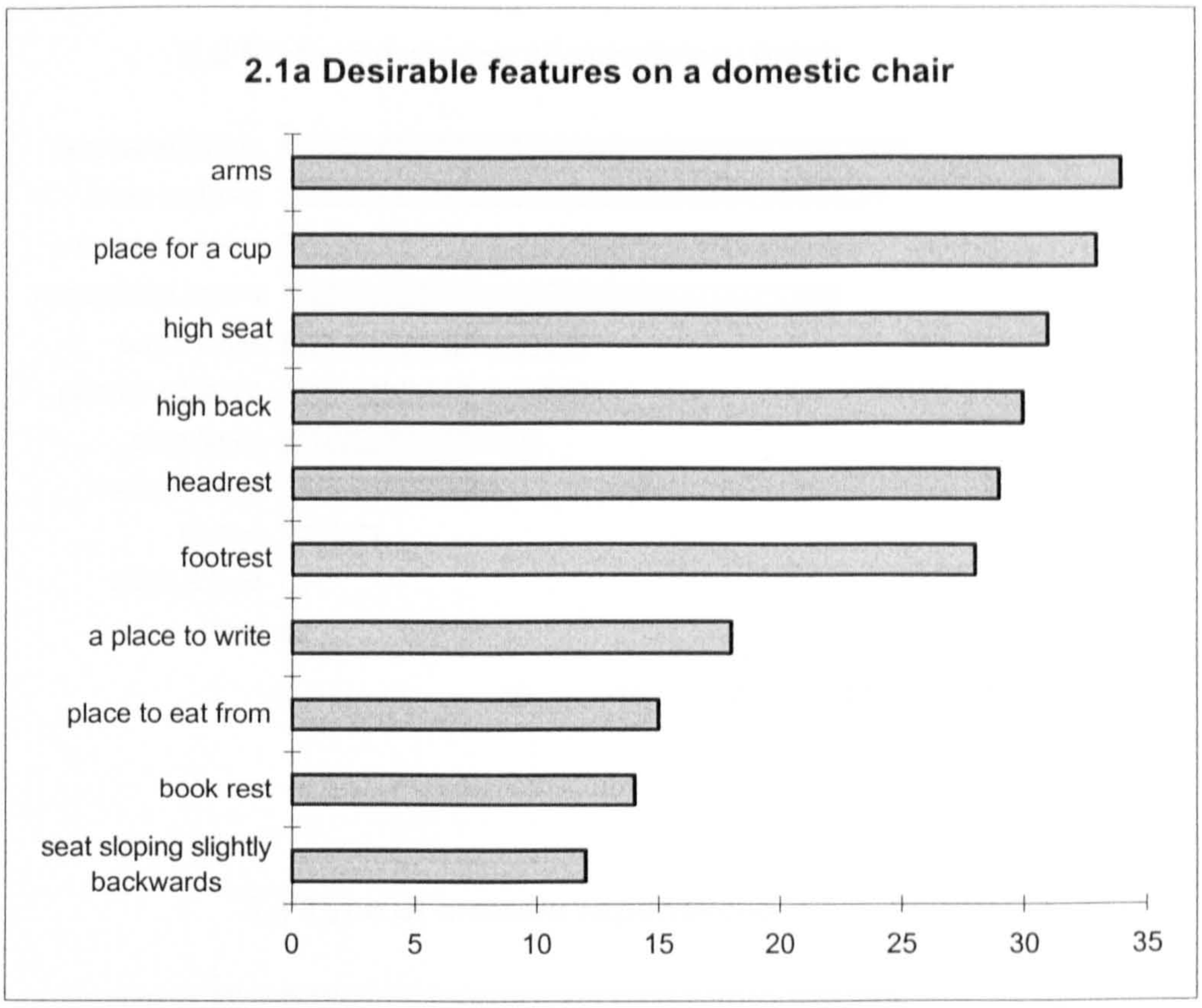


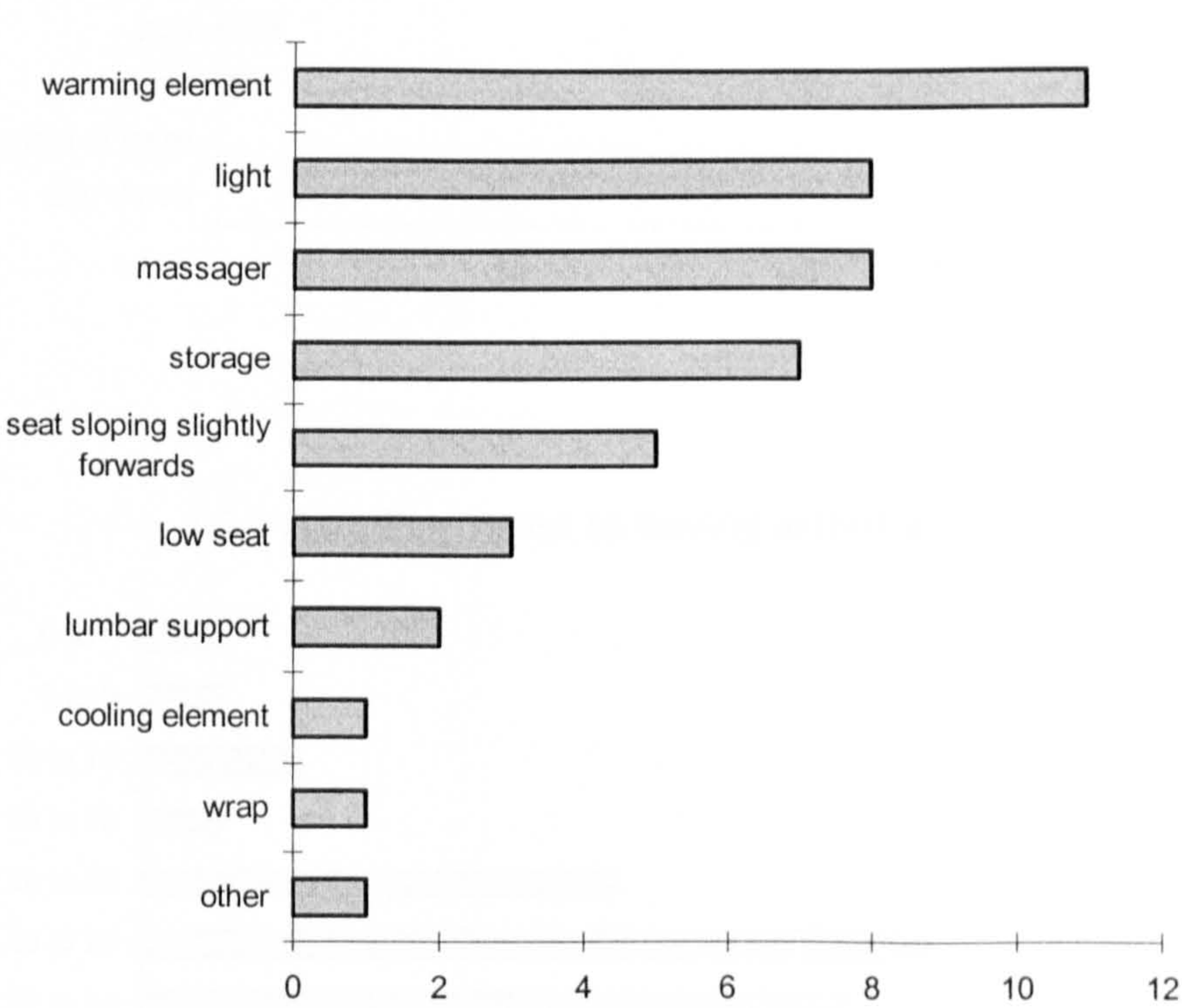
1.6 No. of people who sit during leisure time



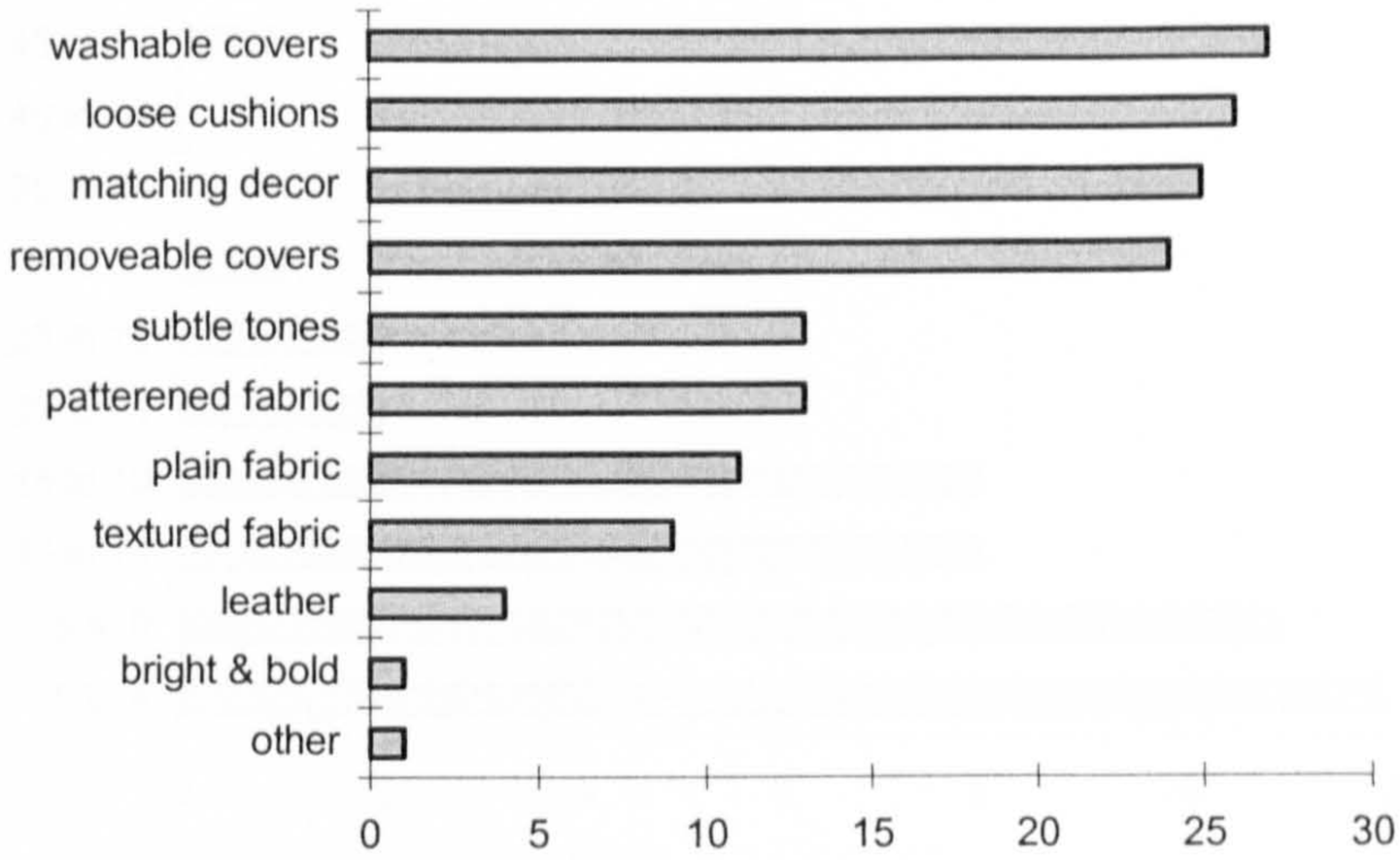
1.7 Activities done from a domestic arm chair



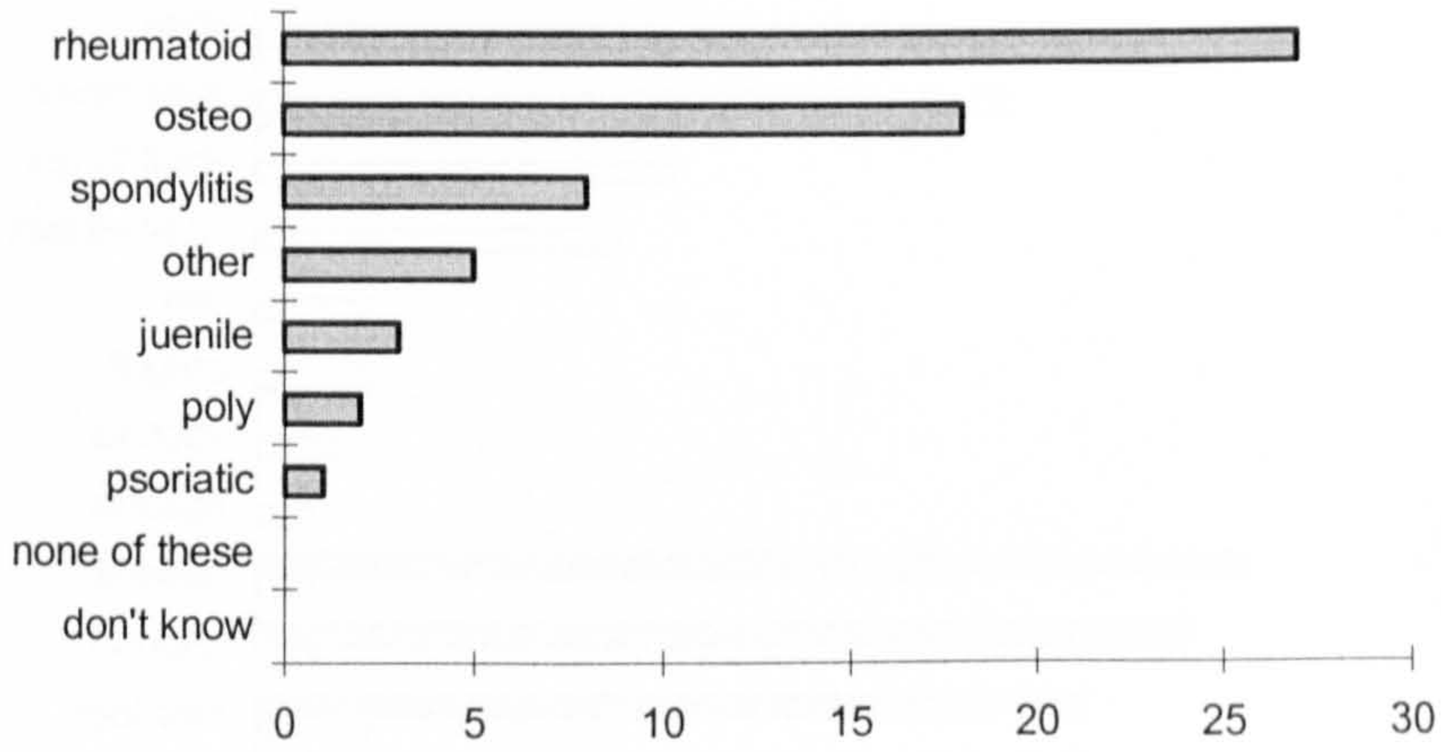

2.1a Desirable features on a domestic chair
arms
place for a cup
high seat
high back
headrest
footrest
a place to write
place to eat from
book rest
seat sloping slightly backwards
0
5
10
15
20
25
30
35


2.1.b Desirable features on a domestic chair
warming element
light
massager
storage
seat sloping slightly forwards
low seat
lumbar support
cooling element
wrap
other
0
2
4
6
8
10
12

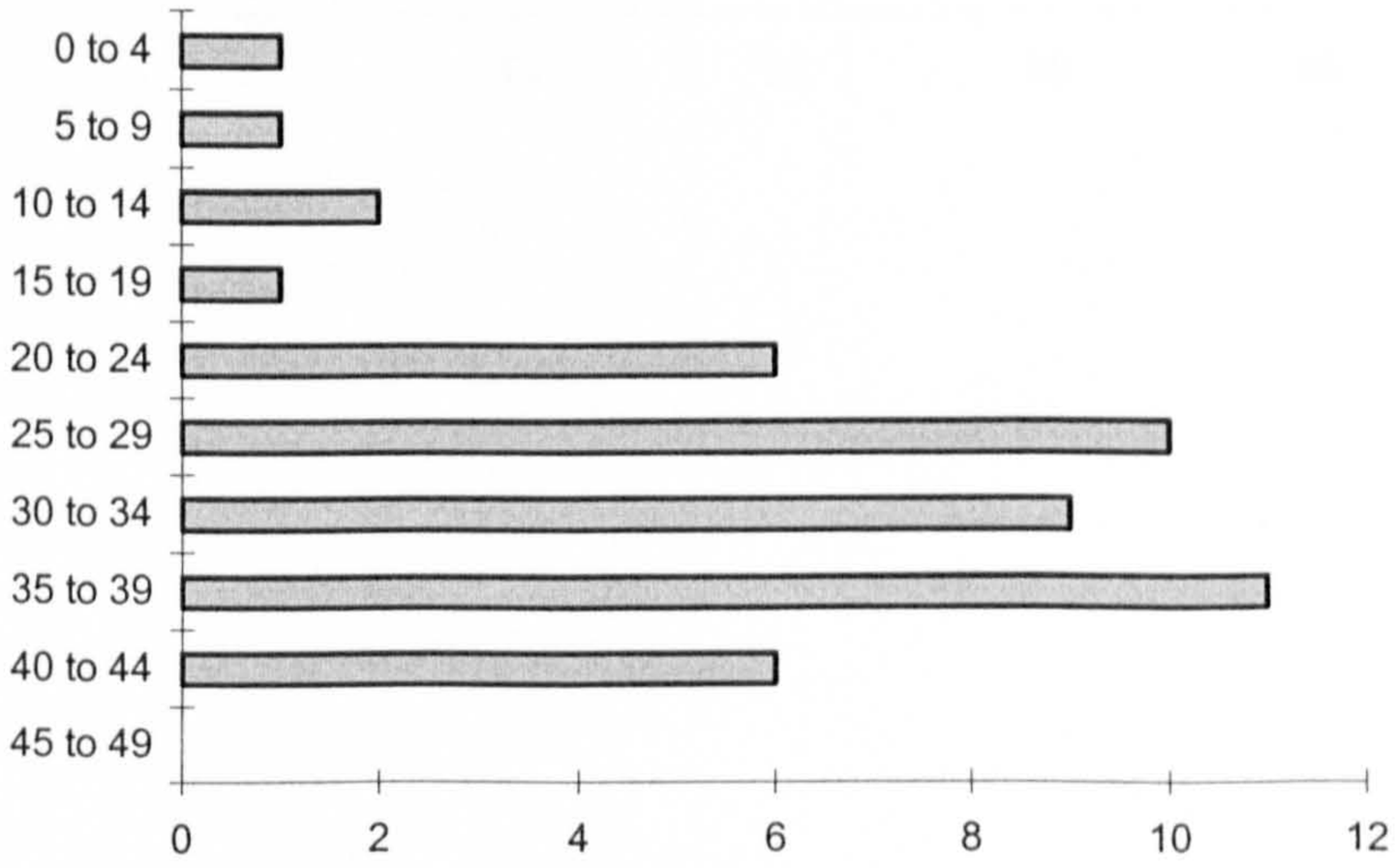
2.2 Preferred choice of upholstery finish



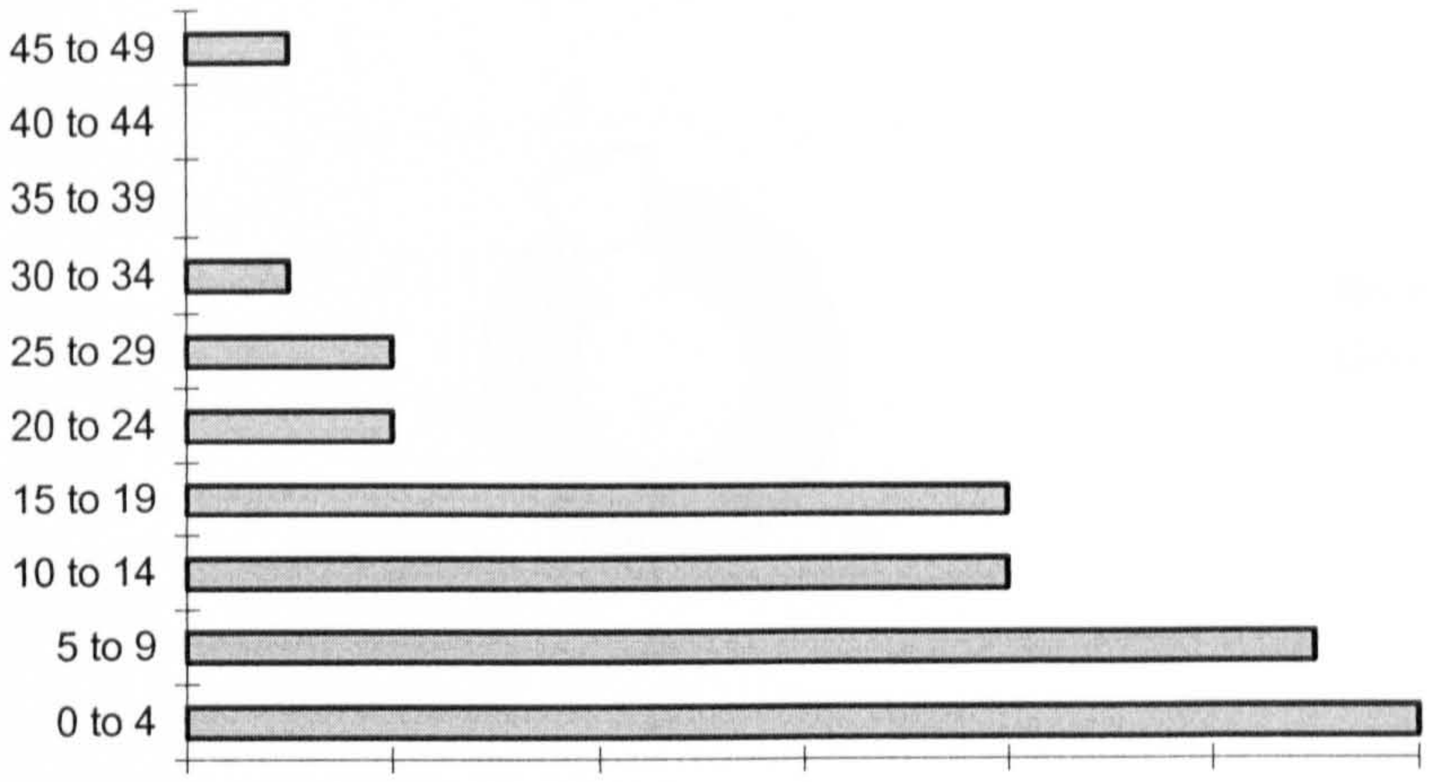
3.1 Type of arthritis experienced



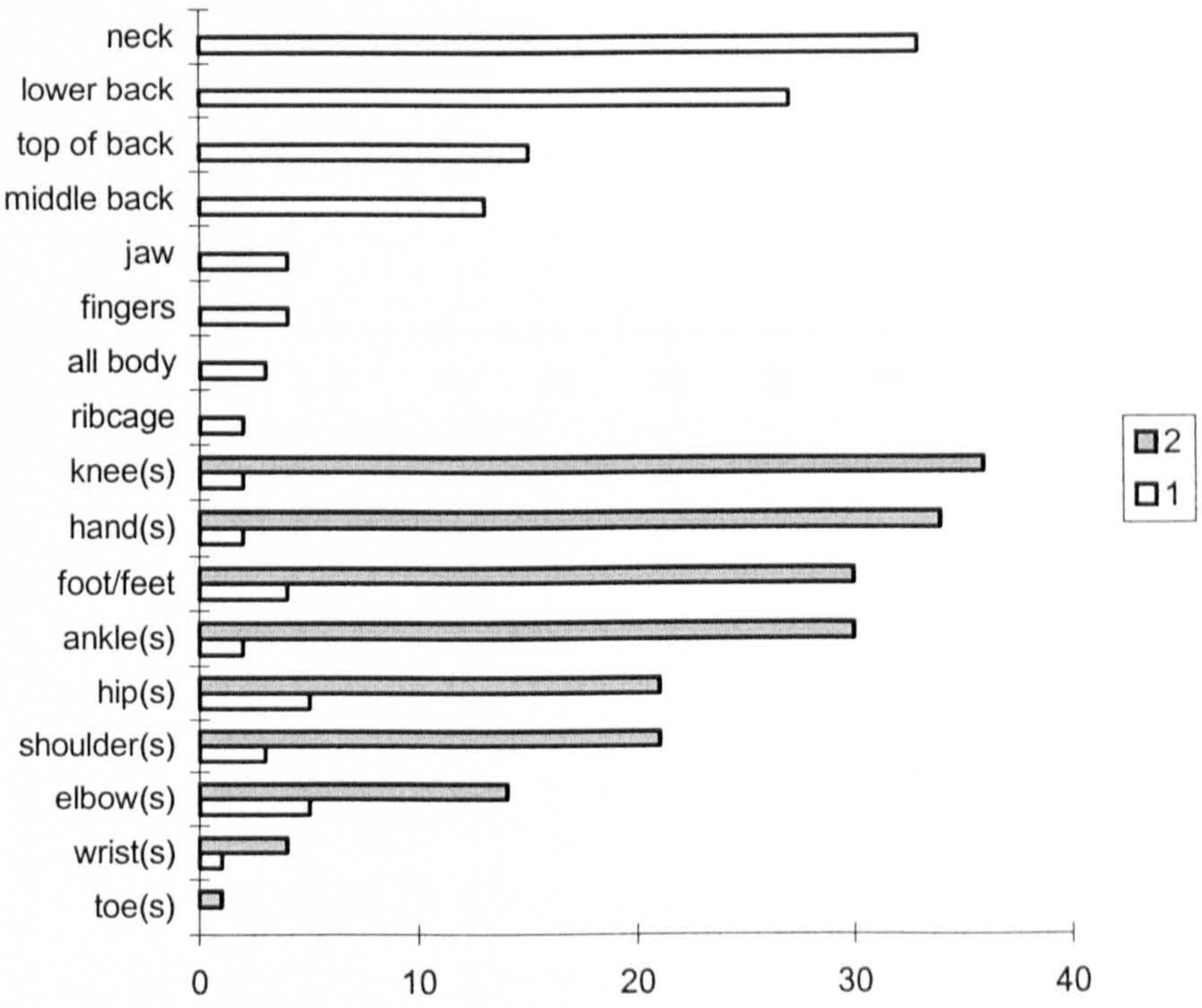
3.2.1 Age diagnosed as having arthritis



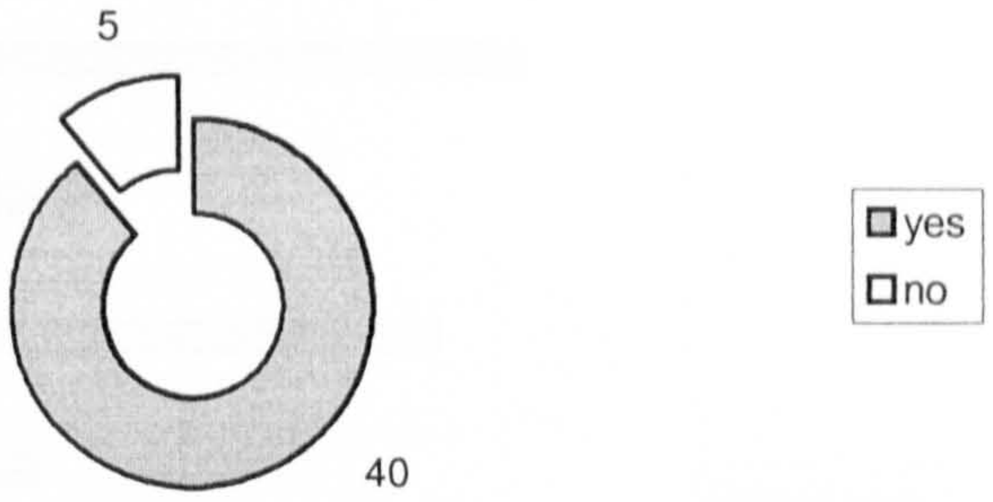
3.2.2 How many years have you had arthritis?



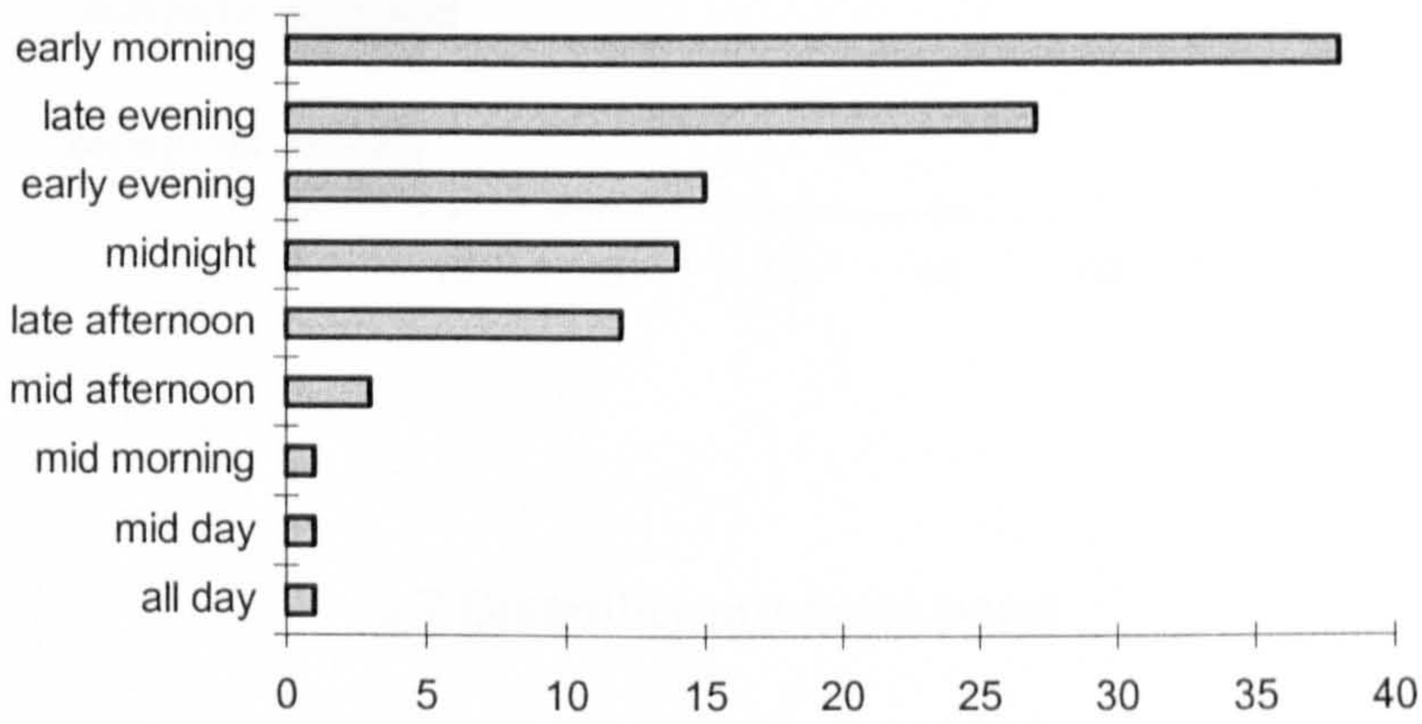
3.4 Part(s) of the body affected by arthritis



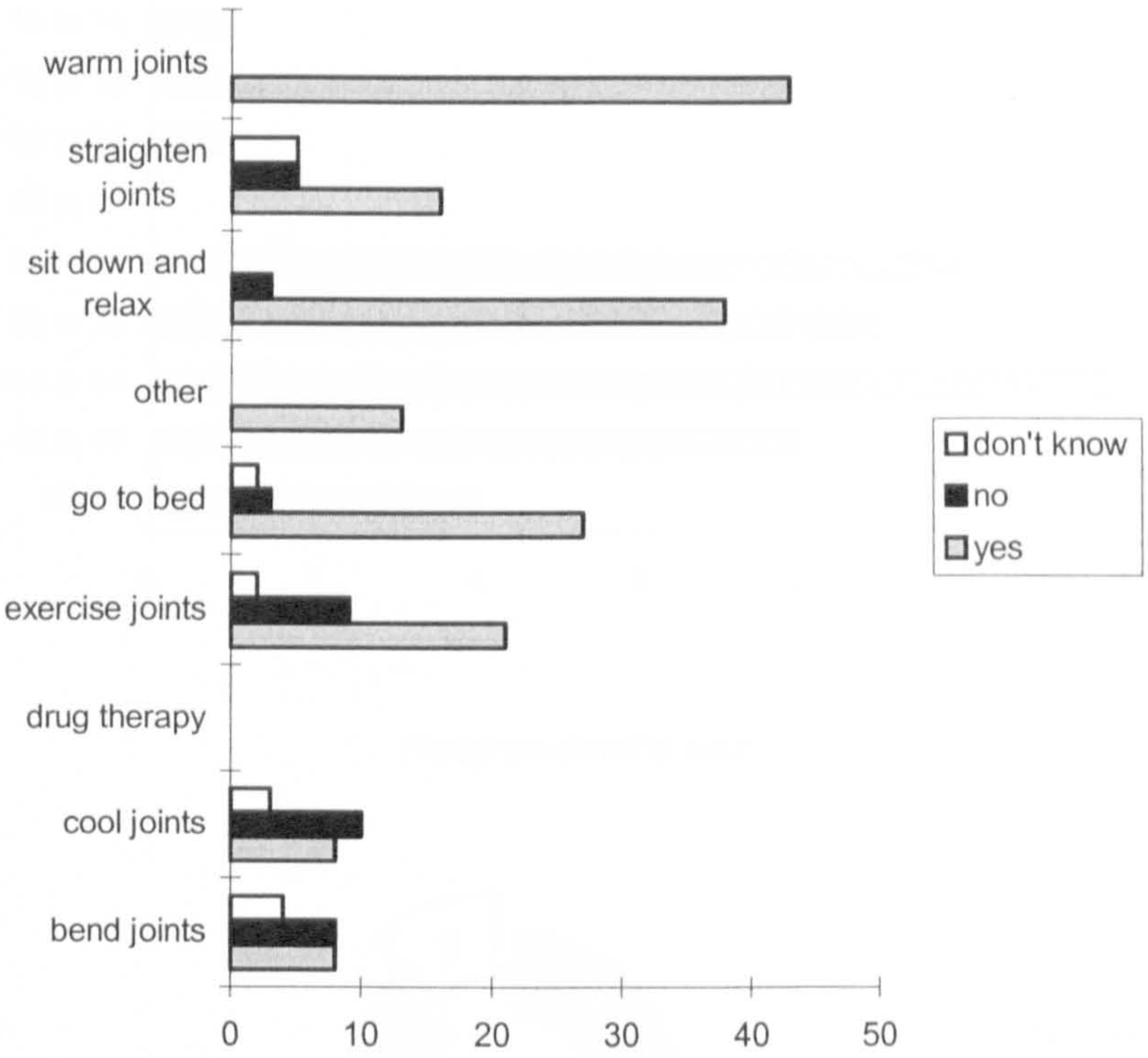
3.5 Are there times in the day when arthritis affects you more?



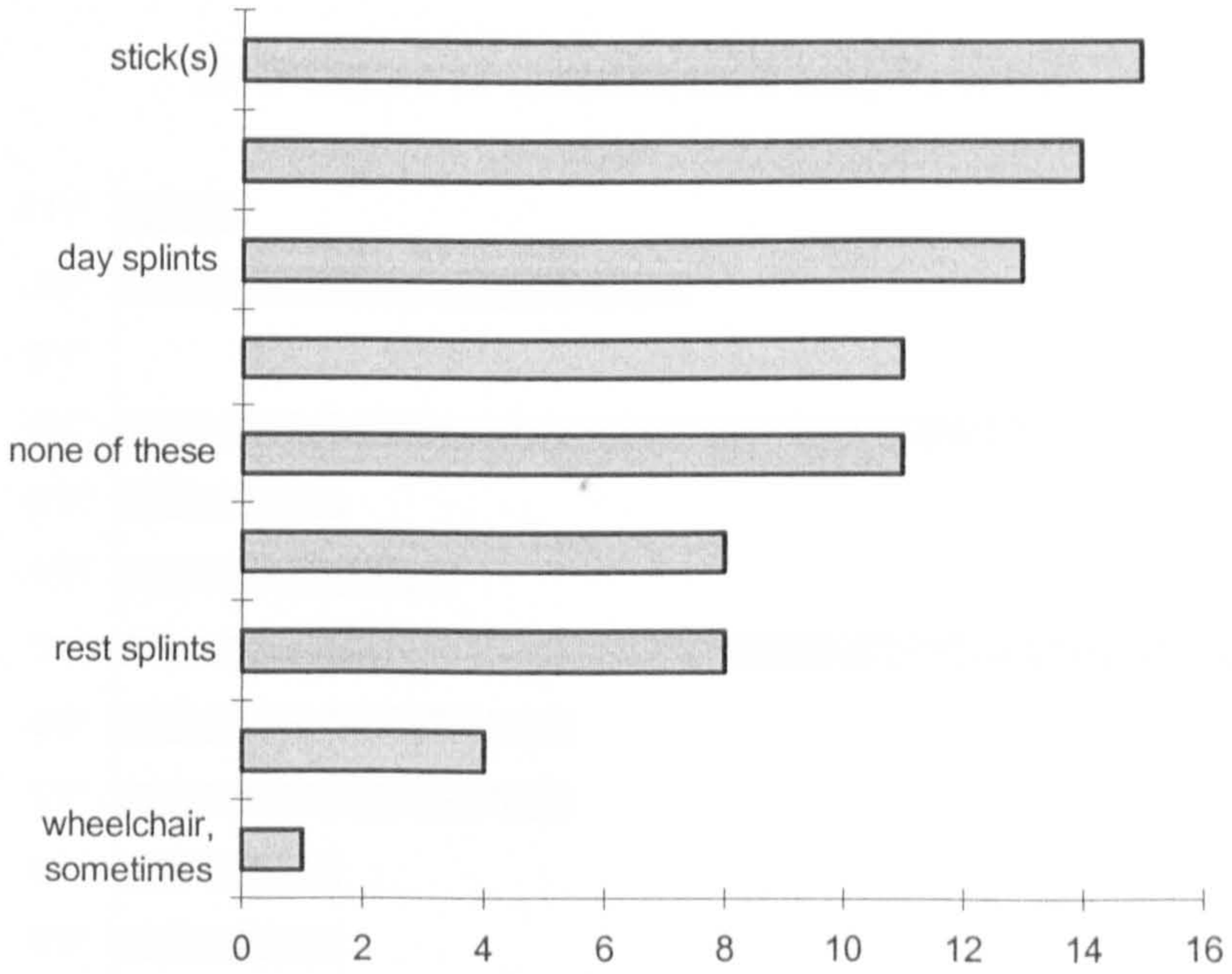
3.5.2 Which part(s) of the day are you most affected by your arthritis

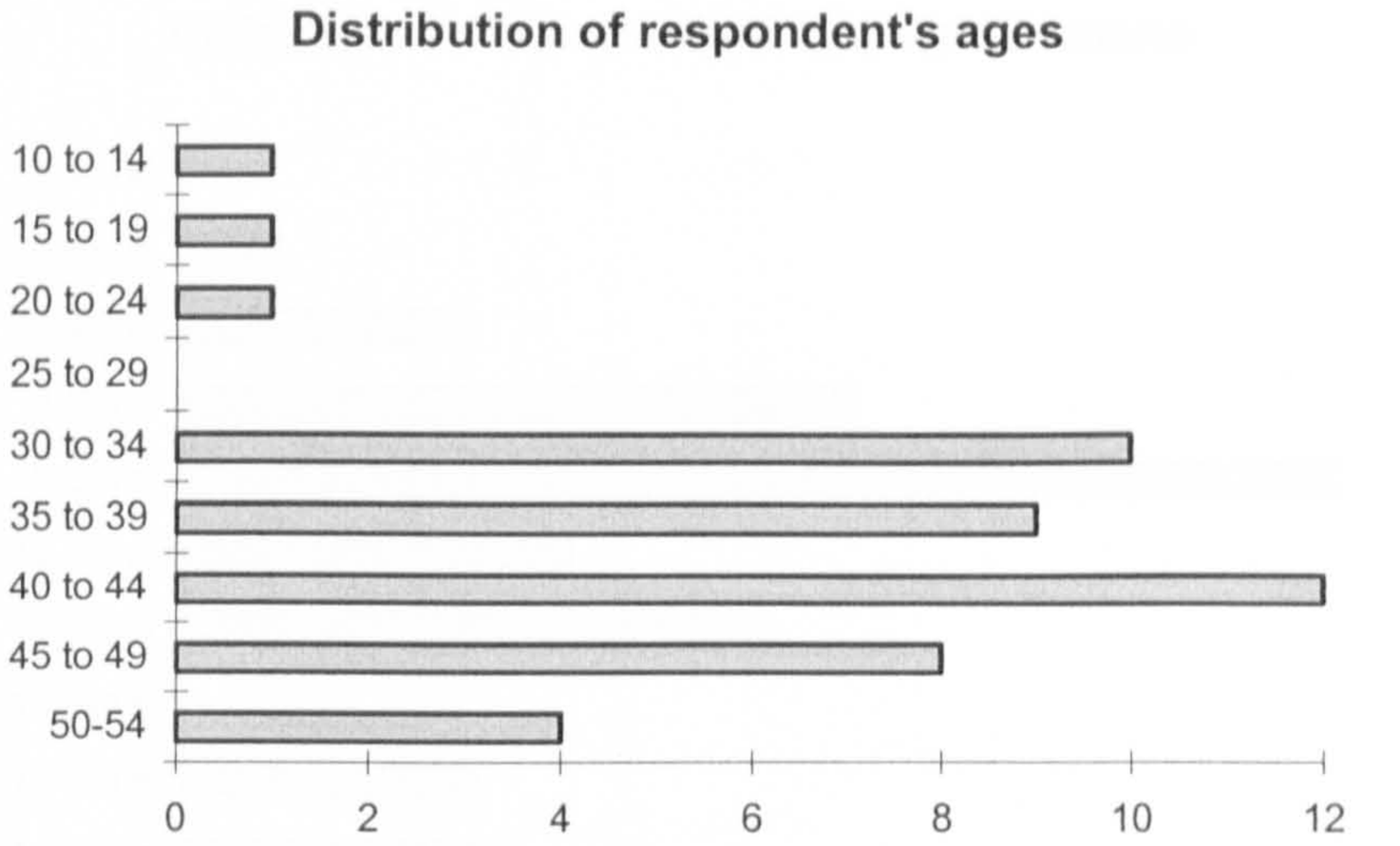


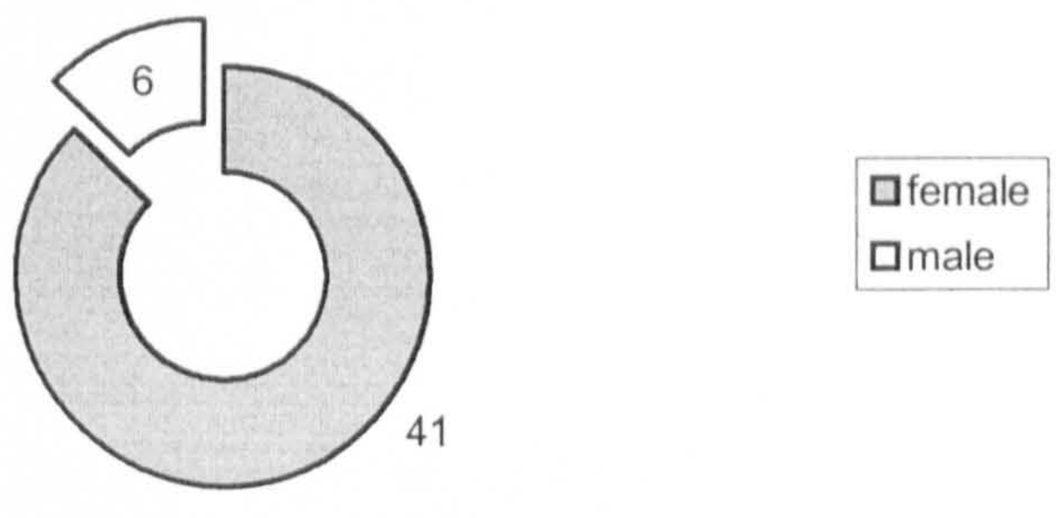
3.6 If your joints ache, is it helpful to ...

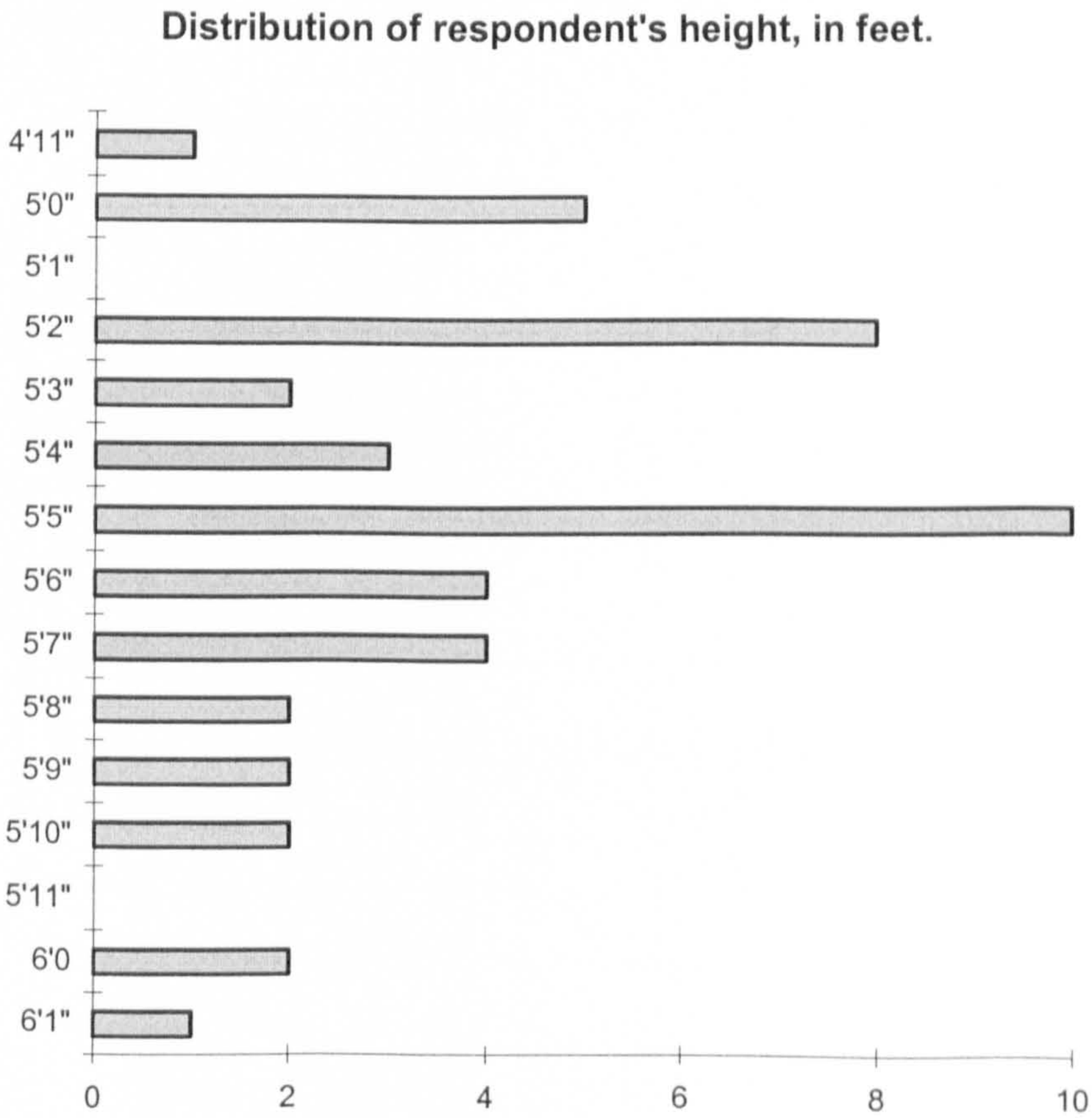


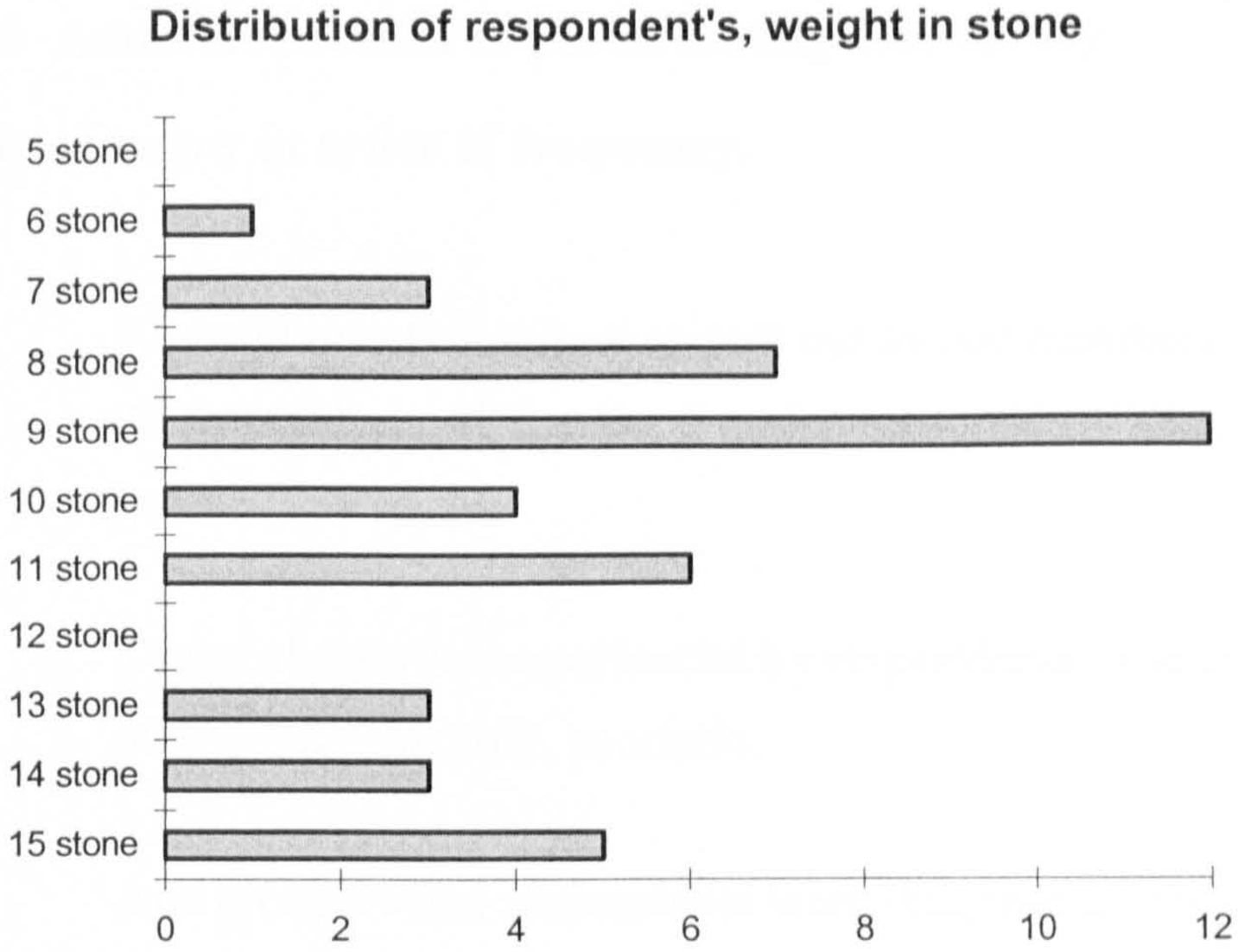
3.7 Disability products used




Distribution of respondent's ages
10 to 14
15 to 19
20 to 24
25 to 29
30 to 34
35 to 39
40 to 44
45 to 49
50-54
0
2
4
6
8
10
12


Respondent's sex
6
41
female
male


Distribution of respondent's height, in feet.
4'11"
5'0"
5'1"
5'2"
5'3"
5'4"
5'5"
5'6"
5'7"
5'8"
5'9"
5'10"
5'11"
6'0
6'1"
0
2
4
6
8
10


Distribution of respondent's, weight in stone
5 stone
6 stone
7 stone
8 stone
9 stone
10 stone
11 stone
12 stone
13 stone
14 stone
15 stone
0
2
4
6
8
10
12

9.3 Annotated results of postal seating user survey

Listed below in order of frequency.

A postal questionnaire was sent out to 100 members of Young Arthritis Care: 47 responded: 41 female, 6 male, respondents were grouped between 14-54 years.

Types of arthritis experienced by respondents: rheumatoid, osteo, spondylitis, other, juvenile, poly, psoriatic.

Age groups when respondents were diagnosed: 35-9, 25-9, 30-4, 40-4, 20-4.

Joints affected by arthritis: knee, hand, foot/feet, hip, shoulder, elbow, wrist, neck, back.

Time of day arthritis has more affect: early morning, late evening, early evening, midnight, late afternoon. When joints ache: warm them up, sit down and relax, go to bed, exercise, keep joint straight.

Types of seat respondents usually used: arm chair, settee, dining/ office chair.

Respondent's favourite chair? armchair, settee: sitting or lying, high back chair with arms.

Types of chairs respondent avoids sitting in: low, low and soft, no-back hard, plastic chairs.

Number of people with therapeutic chairs: 9 have one, 2 used to have , others do not.

Number of arm chairs people have: 28 had two, 12 had one.

Number of settees/ couches people have: 34 have a three-seater, 13 have a 2-seater.

Number of years people had had their arthritis: 0-4, 5-9, 10-14, 15-19, 20-24.

Number of people in household who would sit and relax during leisure time: 2,3,4,1,5,6.

Activities usually done seated during leisure time: watch TV, read, eat, drink, talk, write letters etc., listen to the radio, sew, other, pay games, use a computer.

Features desired in domestic seating: arms, place for a cup, high seat, high back, head rest, foot rest, a place to write, a place to eat from, book rest, seat sloping slightly backwards, warming element, massager, light, storage, seat sloping slightly forwards, low seat, cooling element, wrap.

Upholstery details listed in order of importance: washable covers, loose cushions, matching decor, removable covers, subtle tones, patterned fabric, plain fabric, textured fabric, leather, bright and bold

9.4 Comments made on postal seating user questionnaire

(Replies numbered as received)

1.2 Which is your favourite seat?

1. The settee
2. Wheelchair - Newton, Lightweight
3. Settee, as it allows me to lie down but need upright chair to sit
4. Sofa
5. Armchair - high, firm with straight back
6. Dining chair
7. Recliner - alter position to relieve pain in back
8. High backed armchair, i.e. hospital waiting areas
9. Architect type/ draughtsman high office gas lift chair, adjustable back
10. High back neck support, height of seat measured for me
11. Armchair
12. -
13. I have not got one
14. settee
15. armchair
16. Armchair: soft
17. Armchair it has got raised blocks fitted
18. Armchair
19. Settee with a puffa under feet
20. Car seat (height adjustable/ back inflatable)
21. Raised armchair
22. A wicker, rattan 'conservatory style' chair because it is higher than the three piece suite. We had to get rid of because it was too low for me.
23. armchair
24. High back chair with arms
25. High armchair
26. My mum's armchair! High seat and back, firm cushions padded arms with wooden ends
27. My raised armchair
28. Recliner - I am short as well as having R.A. and my chair seems the right height and length for my legs.
29. Firm with back and arms
30. Supportive arm chair

31. Armchair, high seat firm but comfortable. As it isn't a recliner use footstool with chair.
32. Lying on settee.
33. Armchair
34. Rise and recline electric armchair
35. -
36. Settee with feet on footstool
37. -
38. Armchair, fairly high.
39. Armchair
40. Armchair raised by 9" with solid seat
41. Adapted Office chair, provided by "Access to Work"
42. Settee, for lying down rather than sitting
43. High, with a straight back
44. Recliner
45. Armchair
46. Settee
47. Settee

1.3.1 Are there any types of seats that you avoid sitting in? Y/N

1.3.2 If yes, please describe the seat and say why

1. Hard chair and stools
2. Soft, low chairs
3. Very low squashy furniture and sloped back
4. Bench, recliner and all stools very uncomfortable
5. Soft, low and without support
6. Low seats
7. Too low or soft, and seats with no or little support for my back
8. Low chairs: too hard to get out of, soft chairs
9. Low armless, rear slanting back
10. Low chairs with no arms because I cannot push myself upwards.
11. Any low, soft seat
12. Low seat - hard to get out of
13. Stools, just in case they are not steady and also low and soft chairs as I've had a new hip
14. High chairs, any chair that is higher than the length of my leg from the foot to knee, I have arthritis in my knees, any high chairs tend to make them ache.

15. Low seat
16. Low and soft armchairs, inability to rise from them
17. Low chairs
18. no problem
19. Any hard seat is most uncomfortable
20. Low seats - difficult getting back up
21. Low seats with hard bottoms and no arms
22. Low seats, deep soft settee and hard plastic chairs with no padding
23. no problem
24. Bucket seats, no arms on chairs
25. Low seats because of difficulty in getting up
26. Plastic stacking chairs - get back ache, can't push up to get out of them. Very low chairs/settees -can't get out of them.
27. Low seating
28. Low chairs of any description
29. Low, unsupported back e.g. stools
30. Low large seats and stools
31. Hard seats, low seats, seats without arms or back
32. Tall deep seats and hard wooden seats, stools
33. Benches, stools, low stool
34. Anything low
35. Low stool
36. Plastic seats - waiting room type. Cause pain at base of spine which can last some days if sat on for long enough
37. Low seats
38. Very low - difficult to set out of
39. Low chairs/ Stools
40. Low because I can't get up
41. Low chairs without arms
42. Very low, soft seats - difficult to get up from, and if very low, to sit down.
43. Low stool hard to get out of
44. Low seating
45. Hard wooden chair
46. -
47. Low chairs or unstable, because of getting up.

1.41 Do you have a therapeutic chair? Y/N

1.4.2 *If yes, please describe the seat and say why*

7. no but use recliner as one
8. Use high back neck support, height of seat measured for me because of stiff neck and difficulty bending knees
20. Orthopaedic suite, firm back support
21. Raised ladies draylon chair
22. I was offered the standard issue chair by the local social services but I returned it after a few months because it had no lumbar support and looked horrid and quite out of place in our small 'starter home' living room. I have purchased a 'Putmans wedge' cushion but it does not totally solve my problem of sciatica pain in right buttock/thigh.
27. Cream high backed chair which is by my bed, if I have cramp in the night, I can sit on my chair.
31 High chair, soft and firm with arms and high back
32. A.J.Way and Co - made to measure armchair. Savo office chair - for using computer.
34. Rise and recline armchair, because I am unable to stand up from a normal armchair and need a fairly firm chair.
41. Office type chair with the following: wheel /back support/ forearm and wrist supports, ability to rock if required, fully adjustable.
47. I used to have one.

1.5 What OTHER seating arrangements do you have in your living room area?

2. Two upright chairs
7. Four dining chairs
9. Office recliner executive type
11. plus dining chairs
16. dining room chairs x 3
22. A two seater settee and two armchairs rattan simple conservatory style suit, which I have put cushions on - cost £150 total
26. Dining room chairs, straight wooden backs. Piano stool, box stool (To put my feet on)
40. For dining room chairs and my chair
43. Recliner

1.7 When you are at home, what OTHER activities would you usually sit down to do?

2. I lie down most of the day
9. Computer
13. Sit with my eyes closed to relax
16. Listen to cassette. Type.
22. On a high stool in kitchen when preparing food
24. Cooking. Cake icing.
26. Craft making. Use computer
32. Studying - Open University degree
40. Computer
41. Ironing
46. Computer desk
47. Crochet

2.1 OTHER features that you would like to find on your domestic seat

2. back sloping slightly backwards
7. being able to be reclined
8. must look modern & smart but be practical;
17. firm seating
20. Adjustable back support inflatable
21. Back support, lower lumbar area; massager built in to massage painful areas; rocking action
22. Something to write on: but at a high level so neck doesn't ache; book rest: at eye level/adjustable; lumbar support built into the chair
31. Back wings
32. Ability to slope back rest if needed
40. I would love a recliner, large arms for magazines

2.2 What OTHER upholstery features would you choose for you chair?

40. Won't trap cat hairs

3.4 Which OTHER parts of the body is affected by your arthritis?

1. all my body
2. chest
7. effects most parts of my body
13. Fingers, ribcage, wrists, jaw, every joint
17. wrists
19. fingers
21. jaw
22. static (Sciatic?) nerve in right leg (upper)
23. jaw, fingers, toes
25. fingers, eyes, wrists
32. Jaws and wrists
42. Wrists

3.5.2 Are there times when your arthritis affects you more?

17. Once you have sat down or lain down joints stiffen

3.6 If your joints ache, is it helpful to: ALSO

1. Spend most of the time lying down otherwise chest pain too bad
6. I feel the need to keep moving (so I seize up!)
7. Move them (joints) but not exercise; Go to bed: for a short time only; Have to change a position often
9. Warmth crucial
11. Exercise: slightly; Go to bed: if severe
17. Do a little exercise but also rest
20. Take painkillers
21. A mixture of exercise, rest, warmth during the day
22. A combination of rest and exercise is what I'm told - when my feet are bad I try and keep them up.
24. Move the joint but not exercise
29. Take pain and anti inflammatory tablets
30. Keep mobile
34. What I do varies according to joints that ache
35.Walk

40. Go to sleep
41. Sometimes listed next to all of the actions, to avoid aching.
42. Some joints ease when they are warmed/bent others respond better to cool/ straight.

3.7 Do you Use....

12. I should use them, I don't very often.
13. I used to have night splints when I was younger.
17. Wheelchair occasionally
21. Household appliances, raised toilet seats
24. Sometimes I find the wheelchair more comfortable than the armchair when I am having a bad do. Neck collar.
30. backfriend seat for driving and sitting for a long time
31. Sometime swear night splints, sometimes use a wheelchair.
32. Have got splints - have given up wearing them as they were not helpful
41. Stick, sometimes.
42. Droitwich splints for both wrists should be for 24 hours, but I remove them during the night. Support pads for feet (under arches). Walking stick if needed.
43. A wheelchair sometimes.

47 @ 5.1.96

9.5 Occupational therapist's questionnaire

J. B. was introduced through a cross faculty meeting on design in the University. It was found that we both did work in the field of disability design. We met, discussed our work and he then invited me to participate on a course he was running: Design for Occupational Therapists.

It was a five week course. Participants on the course were Occupational therapists from the central England district, myself and C.W., a wheel chair user and described as a 'disabled client'.

The final week we all presented case studies of our work. I presented my seating project. Using slides and the mock-up I explained the background to myself, the my PhD, the seating case study and funding. The OT's and C. W. then spent time trying the mock-up and completed the questionnaire.

10 were given out 6 were returned. (five were OT's)

The results have been summarised.

9.5.1 Summary of occupational therapist's questionnaire replies

Seating for Young Adults with Arthritis

1.1 Do you have any clients who you think would benefit from the furniture you have seen? Yes 4 no 1 don't know - (probably)

1.2 If yes, can you briefly describe their functional needs

Transferring in/out of chair.

Needs to move about freely, whilst seated, to alleviate stiffness

The design of the chair must give adequate support and comfort, but should not look too clinical in the home setting.

Need reasonable size upright chair, acceptable to them to fit into with their room and give good seating for knee, hip and back problems.

2.1 Do you think that the furniture you have seen would be suitable for other user groups? yes -3 no _____ don't know - 1 (probably)

2.2 If yes, could you list:

Virtually all as we should all sit in an appropriately designed chair, esp. back pain, stroke (cushioning could be used for support).

Residential Care -day centres with wash proof covering for the elderly.

Why restrict this to the young?

People with neurological conditions.

3.0 Please rank each design/detail for its 'usefulness'. *(10 most useful to 0 not useful)*

A. chair- 9, 8, 10, 7, 7,

A. wide arms- 8, 8, 9, 8, 8,

A. wrap- 9, 10, 5, 2,8, 6,

A. day blanket- 9, 5, 5, 9, 8, 4,

A. cushions - 9, 6, 4, 9, 6, 7,

A. footrest - 5, 7, 6, 5, 6, 9,

A. cabinet - 5, 10, 5, 7, 6, 7

A. comments :

Not sure about the foot rest as ideally should sit at the 90/90/90/ angles.

Footrest need work to be more versatile.

4.1 Can you envisage any problems with the furniture?

yes 1 no _____ don't know 2

4.2 If yes, please describe

I would prefer a more upright back to chair.

Foot rest may get in way of chair access both getting in and out!

5.0 Approximately, how much money would you spend on each item/feature:

a. chair - £200, £250-300

b. wide arms - £25, £25-35 per pair

c. wrap - £30, £10

d. day blanket - £40, £15-20

e. cushions -£15, £2.50-3.50 each

f. footrest - £45, £50-75

g. cabinet - £60, £50

h. comments:

Would not be provided by Social Services as doesn't meet our seating criteria

£500 overall, personal view only.

6.1 Have you recommended any chairs, footrests and cabinets to your clients in the recent past? yes 5 no _____

6.2 If yes, please could you describe them and note their approximate cost:

Our criteria only permit us to recommend assisted raiser chairs for supply by our department. However we do give advice on any other types which are usually standard adjustable height chairs.

STD HSC - approx £60 Adj foot rests

Electric raiser recliner chair £700

n/a (not an OT)

Hemco - £700, Falkland chair, A.J. Way 3- £400, Mc Nish

No cabinet, Footrests, basic issue vinyl adjustable height. Chairs Hemco, Mac Nish riser recliners, A.J.Way split lift riser. Renray adjustable high seat chair.

7.0 Does your department have a budget/fund for:

A. chairs yes 3 no 2 don't know _____

A. footrests yes 1 no 4 don't know _____

A. cabinets yes _____ no 5 don't know _____

A. other/comments:

only specialist chairs as above (Our criteria only permit us to recommend assisted raiser chairs for supply by our department. However we do give advice on any other types which are usually standard adjustable height chairs.)

But not high chairs. Would have to be powered to assist client to stand.

n/a (not and OT)

8.1 Please estimate the percentage of people who approach your department with a seating need? % - 50%, 25%,10%, 40%, 40% don't know _____

8.2 What percentage of these have arthritis of some description?

% -50%, 20%, 50%, 90%, 90% don't know _____

9.1 Which of the following outlets would you expect to sell this furniture?

IKEA - 2 High Street store - 5

Independent Living Centre - 4 Mail order - 6

Other:

9.2 Please explain your choice/s:

Standard types of seating available to all

Dislike Ikea, (should be avoided at all costs.)

(next to High Street Store written 'standard high chairs')

Many disabled people find mail order easy. Also as an OT I feel more confident about telling people to go to one.?

10.1 Did the mock-ups *feel* comfortable to you?

A. chair: yes - 6 no _____ don't know _____

A. wide arms: yes - 6 no _____ don't know _____

A. wrap: yes - 4 no _____ don't know - 1

A. day blanket: yes - 5 no _____ don't know - 1

A. cushions: yes - 5 no _____ don't know - 1

A. footrest: yes - 4 no - 2 don't know _____

comments: arms need to be longer

10.2 Does the mock-ups *look* comfortable to you?

A. chair:	yes - 5	no _____	don't know - 1
A. wide arms:	yes - 5	no - 1	don't know _____
A. wrap:	yes - 4	no - 1	don't know - 1
A. day blanket:	yes - 6	no _____	don't know _____
A. cushions:	yes - 6	no _____	don't know _____
A. footrest:	yes - 4	no - 2	don't know _____

11.0 Which of the following features would you like to see incorporated into the designs: *please select and include others that are not listed.*

something to write on - 3	book rest - 2	light - 1
somewhere to put a cup - 4	storage - 2	arms - 2
somewhere to eat from - 3	foot rest - 1	head rest - 4
seat slightly sloping backwards _____	high seat - 1	low seat _____
seat slightly tilting forwards - 1	high back - 1	
warming element _____	wrap, i.e. rug - 1	
cooling element _____	massager _____	

other:

More upright back

Adjustable back rest angle.

12. Can you recommend any changes or other ideas, please write &/or draw them below:

Current chair OK for resting but if watching TV, doing needlework, writing etc. would prefer more upright back to chair. Also? Smaller lumbar support.

Our criteria for provision of seating with in Walsall Social Services is that if a client can manage to stand up from a high chair then they have to provide it themselves.

As much adjustment of the individual components of the chair should be incorporated so as to accommodate all sizes of consumer. This adjustment

could be of a simple nature, i.e.: adjustment plates with multi-piece holes for adjustment. (Cheaper that ratchet mechanism)

Arm rest need to be able to be adjusted in a forward and aft direction to accommodate different arm lengths.

13.1 Do you think that any of the questions were inappropriate?

yes _____ no 1 don't know 1

13.1 If yes, please say why:

Unable to answer question 5

Thank you for your interest and help. Lucy Poole

If you wish, enter your details below:

10. Statistical Analyses: Fishers exact tests

10.1 P-values within the range of .283 to .863

It is unlikely that any statistically significant evidence would have emerged even if the sample had been substantially larger.

Using an analogy of tossing a coin: if a coin was tossed ten times it is quite likely that a result of four or six heads is achievable, just by chance. With a perfectly fair coin the 'expected' result is five. On a larger scale, 400 heads in 1000 tosses would provide extremely strong evidence that the coin was biased in some way.

arms * hands

difference impairments makes on design preferred/ suggested features:

upper limb impairments – inc. hands, elbows, shoulders (3.4) with arm rests (2.1)

		hands		Total
		0	y	
arms	0	5	10	15
	y	6	27	33
Total		11	37	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .283

top back * loose (cushion)

difference impairments makes on design preferred/ suggested features:

Back/neck impairments – including neck, shoulder, top of back, middle back, lower back (3.4) with loose cushions (2.2)

		loose (cushion)		Total
		0	y	
Top back	0	23	9	32
	y	9	7	16
Total		32	16	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .339

arms * elbow

difference impairments makes on design preferred/ suggested features:

upper limb impairments – inc. hands, elbows, shoulders (3.4) with arm rests (2.1)

		elbow		Total
		0	y	
arms	0	11	4	15
	y	19	14	33
Total		30	18	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .351

head rest * shoulders

Difference impairments makes on design preferred/suggested features:

Back/ neck impairments including neck, shoulder, top of back, middle back, lower back (3.4) with head rest (2.1)

		shoulders		Total
		0	y	
headrest	0	8	12	20
	y	15	13	28
Total		23	25	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .394

foot rest * neck

difference impairments makes on design preferred/ suggested features:

Back/ neck impairments - including neck, shoulder, top of back, middle back, lower back (3.4) with foot rest (2.1)

		neck		Total
		0	y	
footrest	0	7	13	20
	y	7	21	28
Total		14	34	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .528

RHEUM * arms

Respondents with rheumatoid arthritis (3.1) with arm rests (2.1)

		Arms		Total
		0	y	
RHEUM	0	8	13	21
	y	7	20	27
Total		15	33	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .531

head rest * top back

Difference impairments makes on design preferred/suggested features:

Back/ neck impairments including neck, shoulder, top of back, middle back, lower back (3.4) with head rest (2.1)

		Top back		Total
		0	y	
headrest	0	12	8	20
	y	20	8	28
Total		32	16	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .537

OST * arms

Respondents with osteo arthritis (3.1) with arm rests (2.1)

		Arms		Total
		0	y	
OST	.00	8	21	29
	1.00	7	12	19
Total		15	33	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .538

HTNUM * high seat

Above average height (optional information) with high seat (2.1)

		High seat		Total
		0	y	
HTNUM	1.00	9	19	28
	2.00	8	11	19
Total		17	30	47

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .546

foot rest * shoulders

Difference impairments makes on design preferred/ suggested features:

Back/ neck impairments including neck, shoulder, top of back, middle back, lower back (3.4) with foot rest (2.1)

		shoulders		Total
		0	y	
footrest	0	11	9	20
	y	12	16	28
Total		23	25	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .559

recliner * lower back

Difference impairments makes on design preferred/ suggested features:

Back/ neck impairments including neck, shoulder, top of back, middle back, lower back (3.4) with recliner (1.1)

		Lower back		Total
		0	y	
recliner	0	18	23	41
	y	2	5	7
Total		20	28	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .683

hands * somewhere cup

hand impairments (3.4) with a place for a cup

		Somewhere cup		Total
		0	y	
hands	0	4	7	11
	y	10	27	37
Total		14	34	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .708

neck * loose (cushion)

back/neck impairments – including neck, shoulder, top of back, middle back, lower back (3.4) with loose cushions (2.2)

		loose (cushion)		Total
		0	y	
neck	0	10	4	14
	y	22	12	34
Total		32	16	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .746

arms * shoulders

difference impairments makes on design preferred/ suggested features:

upper limb impairments – inc. hands, elbows, shoulders (3.4) with arm rests (2.1)

		shoulders		Total
		0	y	
arms	0	8	7	15
	y	15	18	33
Total		23	25	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .757

OST * high seat

Respondents with osteo arthritis (3.1) with high seat (2.1)

		High Seat		Total
		0	y	
OST	.00	10	19	29
	1.00	8	11	19
Total		18	30	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .762

HTNUM * high back

Difference in stature effecting seat height/seat back:

Above average height (optional information) with high back (2.1)

		High back		Total
		0	y	
HTNUM	1.00	10	18	28
	2.00	8	11	19
Total		18	29	47

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .763

foot rest * lower back

Respondents with lower back impairments with footrests

		Lower back		Total
		0	y	
footrest	0	9	11	20
	y	11	17	28
Total		20	28	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .771

head rest * lower back

Difference impairments makes on design preferred/suggested features:

Back/ neck impairments including neck, shoulder, top of back, middle back, lower back (3.4) with head rest (2.1)

		Lower back		Total
		0	y	
headrest	0	9	11	20
	y	11	17	28
Total		20	28	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of .771

10.2 P-values of 1.000

The following analyses, with the P-value of 1.000, show that there is unlikely to by any meaningful statistical association between the two selected variables.

The proportions of yes/no answers, i.e. those preferring or suggesting a recliner, in the two categories could not have been closer. Even had the sample been much larger, there is very unlikely to have been any meaningful association.

Using the coin analogy: a coin 15 times with the results of 7 or 8 heads.

recliner * neck

Difference impairments makes on design preferred/ suggested features:

Back/ neck impairments including neck, shoulder, top of back, middle back, lower back (3.4) with recliner (1.1)

		neck		Total
		0	y	
recliner	0	12	29	41
	y	2	5	7
Total		14	34	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of 1.000

recliner * shoulders

Difference impairments makes on design preferred/ suggested features:

Back/ neck impairments including neck, shoulder, top of back, middle back, lower back (3.4) with recliner (1.1)

		shoulders		Total
		0	y	
recliner	0	20	21	41
	y	3	4	7
Total		23	25	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of 1.000

recliner * middle back

Difference impairments makes on design preferred/ suggested features:

Back/ neck impairments including neck, shoulder, top of back, middle back, lower back (3.4) with recliner (1.1)

		Middle back		Total
		0	y	
recliner	0	30	11	41
	y	5	2	7
Total		35	13	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of 1.000

foot rest * middle back

respondents with middle back impairments with footrest

		Middle back		Total
		0	y	
footrest	0	15	5	20
	y	20	8	28
Total		35	13	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of 1.000

head rest * neck

Difference impairments makes on design preferred/suggested features:

Back/ neck impairments including neck, shoulder, top of back, middle back, lower back (3.40 with head rest (2.1)

		neck		Total
		0	y	
headrest	0	6	14	20
	y	8	20	28
Total		14	34	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of 1.000

HTNUM * low seat

Below average height (optional information) with low seat (2.1)

		Low seat		Total
		0	y	
HTNUM	1.00	26	2	28
	2.00	18	1	19
Total		44	3	47

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of 1.000

shoulders * loose (cushion)

Back/neck impairments – including neck, shoulder, top of back, middle back, lower back (3.4) with loose cushions (2.2)

		loose (cushion)		Total
		0	y	
shoulders	0	15	8	23
	y	17	8	25
Total		32	16	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of 1.000

high seat * early am

high seat (2.1) arthritis affect most in early morning (3.5.2)

		Early am		Total
		0	y	
High seat	0	3	15	18
	y	6	24	30
Total		9	39	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of 1.000

RHEUM * high seat

Respondents with rheumatoid arthritis (3.1) with high seat

		High seat		Total
		0	y	
RHEUM	.00	8	13	21
	1.00	10	17	27
Total		18	30	48

Fisher's Exact Test: Exact Sig. (2-sided) = P-value of 1.000

11. Prototype design specification

11.1 User specification: Adjustable chair to fit person who will test it.

11.1.1 Seat height

- Seat height should suit the individual, approximately allowing the sitter to place their bare foot on the floor. (Ellis Munton, no date given) but 'allow the legs to be stretched well forward (Oborne, 1982)
- The adjustable seat height range is 345-523mm for adults (Dreyfuss, 1981)
- A fixed seat of 433mm accommodates the largest number of adults (assumed US population) but a 25-51mm footstool may be necessary for the small female.
- Seat must raise to 523mm
- Seat must lower to 345mm

11.1.2 Seat width

- Seat width, of 430-450mm is recommended (Oborne, 1982)
- Seat widths must be grater than 406mm (Dreyfuss, 1981)

11.1.3 Seat depth

- Seat depth, of 400-430mm is recommended (Oborne, 1982)
- Seat length (depth) must be greater that 330mm - up to 457mm (larger than 406mm does not accommodate a small female) (457mm is recommended for thigh support for larger people) (Dreyfuss, 1981)

11.1.4 Seat density

- Seat density should be firm and even, not soft or so that the sitter sinks in too far. A depth of 38mm medium foam over 1.3 closed cell padding, to prevent 'bottoming out'

11.1.5 Under seat clearance

- 'A clearance of 76mm is needed behind the front edge to allow the feet and legs to move back as an assist in rising from the chair.' (Dreyfuss, 1981)

11.1.6 Arm rests

- Must be sturdy & take the full weight of an adult male (approx. 16 stone?)
- Arm rest should have a radii greater than 8mm (Dreyfuss, 1981)
- Arm rest upholstery should be a minimum of 5-8mm if dense enough to prevent bottoming (Ibid.)
- Arm rest height should be 178-254mm above compressed seat height (216mm 'satisfied most people') (Ibid.)
- Arm rest minimum length - 305mm. 'Arm rests must always support the elbows'. (Ibid.)
- Arm rest minimum width 5.1mm - adequate ranges are 64-89mm. (Ibid.)
- Arm rest spacing: minimum of 483mm - maximum 559mm. (Ibid.)

11.1.7 Seat back

- Seat back must be high enough to support the back, shoulder & head. (Ellis & Munton, no date given)
- Height of full back support for relaxing 533-711mm above the seat. (Dreyfuss, 1981)
- Seat back width for relaxing should be at least the same width as the seat, 406-450mm. (Ibid.)

11.1.8 Back rest – seat angle

- The back rest to seat angle should be greater than 90° and beyond 100° for a lounge chair. (Ibid.)
- 125° recommended for low tension on the spine. (Grandjean & Hünting, 1977)

11.1.9 Seat angle

- Seat angle for an easy chair 19-20° (Oborne, 1982)
- Seat surface inclination 14°. (Grandjean & Hunting, 1977)

11.1.10 Lumbar support

- Lumbar support: 229-254mm above a compressed seat. (Ibid.)
- Lumbar support concavity: 15-25mm (Ibid.)
- Padded lumber support: 254mm radius, & measure 152-229mm top to bottom & 330mm wide. (Ibid.)

11.1.11 Head rest

- Head rest height: 127-152mm. (Ibid.)
- Head rest width: minimum 254mm (Ibid.)
- Head rest angle: 5-10° forward of the back rest plane. (Ibid.)

11.1.12 Seat covering

- Seat covering should be porous and breathe, low in static electrical effects & easily cleaned. (Ibid.)

11.2 Component & material specification for prototypes

11.2.1 Cream & red chair[3]

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[3] British Standards Institute:

BS 3044: 1990 - Guide to ergonomic principles in the design and selection of office furniture

BS 4875: Part 1: 1985 - Strength and stability of furniture, Part 1 Methods for determination of strength of chairs and stools.

BS 4875: Part 2: 1985 - Strength and stability of furniture, Part 2 Methods for determination of stability of chairs and stools.

BS 5459: Part 1: 1977 Specification for performance requirements and test for office furniture, Part 1. Desks and tables.

BS 5459: Part 2: 1990 Specification for performance requirements and tests for office furniture, Part 2. Office seating.

BS 5459: Part 3: 1983 - Specification for performance and test for office furniture, Part 3 Storage furniture.

BS 5852: Part 1: 1979 Fire tests for furniture, Part 1 Methods of test for the ignitability by smokers materials of upholstered composites for seating.

BS 5852: Part 2: 1982 Fire tests for furniture, Part 2 Methods of test for the ignitability of upholstered composites for seating by flaming sources.

BS 5866: Part 4: 1991 Blankets suitable for use in the public sector, Part 4. Specification for flammability performance.

BS 5940: Part 1: 1980 Office Furniture, Part 1 Specification for design and dimensions of office workstations, desks, tables and chairs.

BS 6250: Part 1: 1982 - Domestic and contract furniture, Part 1 Specification for performance requirements for seating.

BS 6250: Part 3: 1991 - Domestic and contract furniture, Part 3 Specification for performance requirements for cabinet furniture.

BS 6261: 1982 Evaluating the appreciation of and interaction between components in upholstered furniture.

11.2.1.1 Red chair

fire retardant backed **upholstery fabric**> 5m[4]

- **calico** (60" wide) for covering foam under fire retardant backed upholstery fabric 5m
- combustion modified fire retardant **foam** 37.5mm thick

seat back	2(800x500mm)
seat	2(500x500mm)
arms	4(400x500mm)
wings	4(400x300mm)

- combustion modified fire retardant **reconstituted foam:**

25mm (8lb density – 'hard')	seat	2(500x500mm)

BS 7179: Part 5: 1990 Ergonomics of design and use of visual display terminals (VDTs) in offices, Part 5. Specification for VDT workstations (3.6 chair mentions 5 star bases)

BS EN 1102: 1996 Textiles and textile products - Burning behaviour - Curtains and drapes - Detailed procedure to determine flame spread of vertically oriented specimens

BS EN1101: 1996 Textiles and textile products - Burning behaviour - Curtains and drapes - Detailed procedure to determine the ignibility of vertically oriented specimens (small flame)

[4] Standards

BS 5690: 1988 Abrasions

BS 1006 B02Colour fastness to light

BS 1006 section x12 Colour fastness to rubbing wet & dry

BS 1006 section D02 Colour fastness to rubbing with organic solvents

BS 1006 section UK-TB Colour fastness to shampooing

BS 2543: 1991 Appendix E Colour fastness to water

BS 2543: 1991 Appendix A Seam Slippage

BS 2576: 1968 (1986) Breaking strength

BS 4948: 1973 (1982) Tear Strength

BS 5852: Part 1: 1979 Fire tests for furniture, Part 1 Methods of test for ignitability by smokers materials of upholstered composites for seating.

BS 5852: Part 2: 1982 Fire tests for furniture, Part 2 Methods of test for ignitability of upholstered composites for seating by flaming sources.

- **formed ply**, upholstered quality all with 40mm outside radius from same mould

  Arms 2x250mm deep, 550mm wide, 300mm tall

  Back 1x 750mm tall, 500mm wide, cut off after radius

  Seat 1x500mm wide, 500mm deep, cut off after radius

  Wings 2x (could be 7mm ply) 200mm deep, 200mm tall, 250mm wide

- **under seat plate** PRL 21.20.296.00
- **J tube** SOS 21.20.294.00
- **large hand wheel** VGJ 11.41.245.73
- **Tee nut** steel zinc plt M6 (Alexander ZT MO6Z) 72 off
- **MC screw** steel zinc plt hex hd M6x15mm

  24 off (chair seat back plates)

  16 off (chair seat plate)

  16 off (per bracket: seat to arms (32 per chair))

  total 72off

- **Nut** (for casters) hex thin steel zinc plt M8 16 off (4 per base)

11.2.1.2 Cream Chair

- woollen (75% min) upholstery **fabric**#
- fire retardant **interliner** (54" wide) for covering foam under woollen (75%) upholstery fabric
- combustion modified fire retardant **foam** 37.5mm thick

Seat back	2(800x500mm)
Seat	2(500x550mm)
Arms	4(400x550mm)
Wings	4(400x300mm)

- combustion modified fire retardant **reconstituted foam:**
- 25mm (8lb density – 'hard') seat 2(500x550mm)
- **formed ply**, upholstery quality all with 40mm outside radius from same mould

arms	2x250mm deep, 550mm wide, 300mm tall
back	1x 750mm tall, 500mm wide, cut off after radius
seat	1x500mm wide, 550mm deep, cut off after radius
wings	2x (could be 7mm ply) 200mm deep, 200mm tall, 250mm wide

- **under seat plate** PRL 21.20.296.00
- **J tube** SOS 21.20.294.00
- **large hand wheel** VGJ 11.41.245.73
- **Tee nut** steel zinc plt M6 (Alexander ZT MO6Z) 72 off
- **MC screw** steel zinc plt hex hd M6x15mm 16 off

  24 off (chair seat back plates)

  16 off (chair seat plate)

  16 off (per bracket: seat to arms (32 per chair))
- **Nut** (for casters) hex thin steel zinc plt M8 16 off (4 per base)

11.2.2 Asymmetrical fabricated chair base

- 50mm O.D. **mild steel tube** with 2mm wall thickness cut to lengths & welded to a:
  - mild steel tube **taper**:

wall thickness 4.5/5mm, upper outside diameter 59mm, lower outside diameter 57mm, 50mm deep.

- Caster peg socket fabricated from short length of tube with a bored washer, with a clearance hole for threaded caster.

- finished by **powder coating**, satin black
- 4x lockable black **casters** OTWG50B
- 4x **threaded pins** M8x15mm thread
- **1x Fixlift** (non-swivel **gas column**) powder coated matt black

(code either 019 02134 or 019 02133)

or

- non-swivelling gas Stab-o-bloc **column**, 2091HF finished in a matt black powder coating (only 9" available)
- **under seat plate** PRL 21.20.206.00
- **large hand wheel** VGL 11.41.245.73

11.2.3 Symmetrical fabricated foot rest base

- 50mm O.D. **mild steel tube** with 2mm wall thickness cut to lengths & welded to a:
  - mild steel tube **taper**:

wall thickness 4.5/5mm, upper outside diameter 59mm, lower outside diameter 57mm, 50mm deep.

- Caster peg socket fabricated from short lengths of tube with a bored washer, with a clearance hold for threaded caster

- finished by **powder coating**, satin black

- 4x black **casters** OTWG50
- 4x **threaded pins** M8x15mm thread
- **1x Fixlift** (non-swivel **gas column**) powder coated matt black

(code either 019 02134 or 019 02133)

or

- non-swivelling gas Stab-o-bloc **column**, 4x2091HF finished in a matt black powder coating (only 9" available)
- combustion modified fire retardant **foam**: 37.5mm thick (520x800)
- **under seat plate** PRL 21.20.206.00
- **large hand wheel** VGL 11.41.245.73

11.2.3.1 Footrest form

- **formed ply**, upholstery quality all with 40mm outside radius from same mould as seat.

  700x500mm

11.2.4 Cabinet

- **White beech**

  Wany edged, rough sawn 1500mm/ 5ft, 75mm/ 3", 300/ 12"

- **MDF**

  1220x 2440mm boards

  1x12mm MDF (drawers lining)

  1x15mm MDF white beech double sided (cab sides)

  1x18mm MDF white beech one sided with red wood balance (top & floor, arms)

- **Resin** BR500PA (5 kilo)
- **Catalyst** (100ml)
- 2x **nuts & bolts**
- 4x **casters**
- 4x **caster plates**
- 2x R&L **drawer runners**
- **wood screws** to fix

  caster plates to cabinet posts (measure clearance)

  drawer runners (measure clearance)

12. Transcripts from design meetings

12.1 Transcript of family & friends meeting 8-9.2.97

Adjustable chair suited smaller than average woman

M: Liked the fact that she fitted the chair, her feet touched the floor, and the seat wasn't too long.

Practicalities of cleaning

V: Chair should be on casters. People will want to move the chair to clean behind it.

J: Cover the timber with upholstery fabric, other wise you would have to clean it. You can Hoover upholstery but you have to clean timber.

Perceived difference in taste for different ages

C: If its for older people then cover the timber and make it look fatter for younger people leave the timber exposed and leave it slim.

Jn: If its for young people it could look really funky.

Grip for rising from chair

A: Its nice to be able to get your hands over the edge, right round the hand grip.

Colours

Lsl: warm colours, light & dark green fleck.

Pricing

V said the stool should be a third of the chair.

M stool should be a quarter the cost of the chair.

J said that the stool should be half the price of the chair.

A said the stool would be more than half, so that the chair appears cheaper.

12.2 Transcript of design meeting with J & M

Took chair, leg rest, wrap, cushions and day blanket and set then up in the front room. I didn't take cabinet.

The following is a transcript from one side of a C90 tape. Italics are my thoughts, anything in parentheses is to clarify any gestures.

14.3.97

J The lever to be located at the front, underneath of the chair

M Mike seat shell, in GRP with upholstered pads

M Car seats that spring forward, so that the rake of the back can be altered

L Seating experience is what is replicated by the mock-up.

L If you put this (the leg rest) under your knees…

J 'No, I prefer it (the leg rest) further away. I think when you are getting your feet out like that its not a very elegant experience. I think to have it like that (the leg rest positioned further away) To be able to swing your legs round much more elegantly, especially for women.'

J It would be nice if you could define that shape (the curve of the footrest) It could refer to the rest of the chair.

J 'The seat is a bit short: I'd still prefer the seat to be a bit longer (At least 5 cm longer)

L I had intended that the leg rest to come right up against it.'

J 'Yes, but as I just said, its not comfortable.'

M 'If you're getting up, you don't want the edge to be too far away. You have to get into position to get up so you don't want to have to shuffle.'

Mike felt that the back left his shoulders exposed, wings might solves this:

L 'Yes your shoulders are just a bit outside the profile of the chair back. Does a winged chair feel better?'

M I don't know, it feels a bit like a car seat, they tend to have more padding on that come around the shoulders

L So you want it to have wings?

M I don't think they are that useful, because they are just too far over. If you get to that position (with your head in the wing) I think most people have them to wedge their cushion against the wing and then prop your head against the cushion.

The wings would have to be free to be positioned in different places, depending on how tall the person.

M 'I would find it more comfortable if my knees aren't completely straight… I've inherited crap knees… This is how I find it more comfortable, its like when I'm in bed, this is how I'm more comfortable.'

Day blanket

J You can get fire retardant sprays, If its a commercial property then the fabric needs to be fire retardant

L Do you think that blankets would be the same fire regs as curtains?

J Yes if they are sold

J I like the idea, I like the colours…

L You could have a wool for the warm side and maybe a linen for the cool shell.

J May be cotton.

Talking about the wrap:

J 'I don't really like the idea… I think you'd have to, I'm looking at the colours here, try and make it looking stylish rather than, using old fabric. Make a feature of it, not make it as a separate thing, make it part of the chair. Because (otherwise) I think it could get to be lots of bits, it needs it be integrated somewhere, you need to get a continuity of fabrics and surfaces.'

L What do you think about these wraps, they could be any size, they could be tartan, spotty…You could just reach around the back where positioned along the back, or from over the arm

J Yes, they were warm around you shoulders.

M I think the idea works quite well, but in reality it would get ripped to shreds

L Ah, yes if you had a cat they would get ripped to shreds…

J One thing I would say. If its aimed at younger people then I think the idea of having a wrap around your shoulders is very old fashioned.

L I think the day blanket has got to be really washable, because you could be sitting with your legs out like that, eating you dinner on you lap and I am aware that people will spill things.

J I think choosing fabrics would be an important thing.

L What colours then?

J I think the terracotta you've got there work well.

L Patterned or plain?

J I like the Jaquard you've used there is nice.

L Do you prefer that to Draylon?

J&M Yes

L The base is tubular steel which can be powder coated: There is the option of putting a turned timber foot…

J I think the main thing is the chair, so that you shouldn't draw attention to the feet.

L What about the dollopy bit at the end of the arm, do you see it as an advantage, a plus?

M Yes, you could put your TV remote control here….

L I did another arm with a half round shape, without the cut-out

J I quite like this one, you can use the hand rest.

M I like the style of it.

L Do you think it looks strange?

J No, I think it could be made to look stylish. I think if you can make the upholstery firm…

M Will it have the curved bit as well?

L Yes, that's the next step. That width, with or without the dollop. It can just go straight up, but instead of being a right angle, it would be laminated into a curve. So that it all ties in. Throughout the chair, footrest and cabinet it would all use the same radius….

They both like the rocking of the back:

L The upholstery man said that I should figure the back and add more weight to the arms. He's traditional…

J I think you just want to keep the forms as simple as you can. Its aimed at a certain market.

L Are you feeling more or less comfortable?

M I think a bit more padding on the seating…I can feel the bits under my bum,

L Ah, under you tuberosities.

M Have you looked at racing car seats? they are very simply formed.

L Are they moulded? Where's the upholstery in them?

M There isn't any

L Are they made to fit the person?

M No, I think they are surprising comfortable. You are wedged in, its not ideal for this.

L What happens if you are different sizes? Or can you only be a racing driver if you are five foot two. Is it to do with maximum contact area?

M Well, people tend to be on the smaller side but.. You can't put your arms back..

L Because they are forward holding on the steering wheel…..

M They now have a double shell, with a shoulder section and a head section that comes round.

L Is this to do with crash protection? Yes and for vibration

M Yes and as well for comfort. They have velcro-in leg sections, and lumbars, for different parts

L Ah, so this is what make them (the seats) fit

12.3 Transcript of design meeting at Ladybridge, Tamworth

D, M, K, Lucy: L, Km & Z

Quotes are general text, my thoughts and clarification of object in parenthesis.

Conversation is edited only to remove uhmming & ahhring

D

D I need it higher, are you going to do it (seat height) so you can change the height? That's a good idea. I think that's too high.. (I don't think she knew the headrest could be moved) Presumably this (headrest) would be optional?

(Seat width felt a bit wide- but D had lost weight, may be when she was fatter: ' I would have needed that extra space.' (put a cushion down the side)

(Putting feet onto footrest)

L So lifting your leg up wasn't a problem, it doesn't affect your hips at all?

D No, it doesn't. I've had my hips replaced you see, my hips are perfect..

L Swinging them (your legs) up isn't a problem?

D Swinging my hips.. isn't…(laughter)

L What do you think of the arms?

D Yes…

L Do they seem a bit big to you, so you could put your arms how you fancy? They were that shape so you'd have some where for a cup of tea. But I've changed the upholstery.

D It wouldn't be safe would it?

L Do you feel that they are a bit big?

D Yes it does feel a bit big.

Also it might be a good idea if the end was a bit of wood. 'Cos then you would have something firm to push up on…

L You would rather have woo?

D Yeah, just at the end… about that much (50mm)

L You don't think it would feel more comfortable for it not to be wood?

D No, I mean as long as you've got some padding near you. (Under the elbows & forearm) Where your elbows are , that's fine.

I like wings 'cos I go to sleep in the chair, you see. (this notions challenges an initial assumption that younger people would not want to sleep in their chair)

L I think I need a wings option.

D I like wings, do you like wings (asking M&K)

M I haven't got wings on mine (her chair) and I keep loosing my head (off the side)

L What about this kind of shape (half round arm rest)

That's a metre across by the time you…

D Its big you know… in small houses

L Yes, it takes up my living room..

D I don't really think it adds that much does it? So perhaps do without all that.

L What about the footrest?

D You don't want your feet hanging over the edge. Its like now I've got really painful feet and if they were just there and they're hanging over the edge - it would be really uncomfortable. And also its supporting your legs all the way, you want them supported all the way don't you.

L I'm trying to get hold of a mechanism that tilts (For the foot rest)

D You're not supposed to put anything under your knees

L I know you're not <u>supposed to..</u>

Your hamstrings are quite long then, they're not pulling

D No.

L You've done your exercises..

D No I haven't I've got new knees.

L While you are there can I take a photo of you?.. yes?

D A photograph of someone with arthritis..

We're all quite good..(I've got bad arms & hands, new hips & knees, M has bad knees and hands and K has a bad back) So between us we've got quite a lot wrong with us.

L A full range

D Are we going to be in the ARC magazine?

L No it just saves me writing it all down..

D Yeah, you mentioned this.

L What do you think about having a cabinet ? Not this one (cardboard box) this is the maximum volume of space. So you could have your books nearby or your letter, your knitting or you drinks..

D Good idea.

L If it was to be moveable, the same as (the footrest)

D I need everything nearby me. I need the 'phone nearby and everything… I've got to have everything within easy range, really close. I have to reach for my diary and reach for the 'phone book and everything. 'Cos I can't jump up and go rushing 'round.

M Have you done anymore on the inside pocket?

L No, I'm still working on that.

M But it won't hold very much.

D You need somewhere for your remote control. Do you have your phone right next to your chair? (to M&K) I have to have everything, the 'phone book, 'phone numbers and pens.

L Would it ('phone & stored items) have to be on the chair?

D Just within reach.

L I thought about having a shelf that pulls out, so if you want to do writing…

D That's a good idea.

L I think that's why it was high. (cabinet) Would you be able to reach to the bottom of here from this kind of sitting position? Or is it too low?

D Well, I think perhaps at the bottom you could probably put a drawer or something like that. 'Cos it would be too hard to reach into the back. Wouldn't it?

L Not a shelf but a pull out drawer.

M What about one of those video ones you can get in all the way round, where they've got shelves all the way round. You could have one set of books on one rack

D Oh, I see - swivel it round so you're not reaching too far back. If you're going to make it so it turns round, you could make it do that, couldn't you.

L What about your cup of tea? I wanted it to be right here. If these (arm rests) were a bit shorter it would be on there (the cup of tea) Do you think it would be too high?

D Yes, I think make you cabinet lower. 'Cos if its the phone and you've got to reach up …and I can't reach up at the moment so about the same height as the chair (arm)

L I'm developing these wings (wraps) as an upholstery option. They attach top the side (of the chair back) and instead of having your cardigan on your shoulders, you could just wrap around and 'get snug'.

D That's a good idea for elderly people, 'cos they feel the cold, don't they. If you could make them detachable.

L If you had them at the top would you also want one that covers your legs

D hum, as well, that's an idea.

L Would it be something you would think about?

D No not really, not me, no, but elderly people. I mean its an option.

You see what I do to get up , you see just here (at the end of the arm) you need something jolly firm to get up. It doesn't have to be wood. but it does have to be something solid. If you've got soft upholstery your hands just go in.

L I though it would be the other way round. (ie that to push down on a wooden surface would make the joints in the hands hurt)

M

M I've got a recliner, I don't have to put my legs up. Literally I push my head back.

L Would that put you off (this chair)

M In a way it would.

L The thing about the recliners is you can't put your feet behind (under the seat to take your weight). When you get up you put you feet through the chair (between the front legs)

M Ah, 'cos you're going to leave a gap underneath?

L Yes

M 'Cos with a recliner, you don't need strength in your arms you just (push back)

L What about when you had your hips replaced were you recommended to sit with your legs straight? Or with your knees bent?

M You did both really.

D What I had to do was sit with your hips higher than your knees, on a high chair.

M They did actually - put your feet up.

D Oh yeah, you have to have your feet up or otherwise your ankles swell up.

L What about your knees?

M I haven't had to have new knees yet… I'm on old knees.

D You have your legs up. You're supposed to sit with then straight.

L Yes and how about you, are you knees tights?

M Yes my knees are, but whether they're a fraction too high?

L How about that (put a cushion under the knees)

M Oh yes it does make it easier, yeah.

D You're not supposed to do that.

L No its cheating, you're not supposed to do it -'cos the tendons and ligaments tighten up. I'm trying to get a mechanism where the mechanism can title the foot rest.

M A lot of this you've got to have your personal choice.

L Oh yes.

M I mean, I lie down a lot I do but at one point I couldn't lie on the settee, I couldn't get off the damn thing. I've told you that I use one of those triangle cushions. That's a God-send, where ever I am.

L How big is it? Is it full length?

M Yeah, its bigger than one of these (Sacral cushion)

L And that's full of chip foam?

M I think so, yes, its very, very soft. Its bulky.

L As you sit there are you getting more or less comfortable?

M My heads going back in this cushion…

L What do you think about these. (Wrap)

M I think its a good idea, I do.

L You put your wings (Wrap) They would hang down the back and if you sat for a long while , you can just wrap yourself up. So its supposed to be a less invalid type of thing than a blanket.

M I'm a bit tidy Lucy (Concerned about the visual appearance of the fabric pattern, it is not the intended fabric, finish or form)

L Would it get on your nerves? What if it looked like curtains?

M Oh yes if you blended it in…and it looked attractive.

L But do you sit and get chilly?

M I do.

L What do you do?

M I put a coat on. I've got a crocheted blanket I can cover myself up, right up to here.(Under her chin)

L So you use that kind of thins?

M Yes but I put it away after I've used it. You know that coat that I nearly always wear, that waterproof thing? I use that its lovely and warm. Its like a sleeping bag. I call it my sleeping bag and it covers me.

L This is what I'm trying to work on. Something that's there all of the time, looks smart. You don't have to bother putting it away.

M I just don't…

L What about if there was one there and one here? One that covered your legs?

M If I'm just sitting watching the television I don't use a cover.

L 'Cos I go to bed when I feel like that. Not because I want to go to bed, but because I want to be under my duvet.

M I do go to bed sometimes. Then I think I spend too much time in bed.

M Are you going to do it so it reclines back as well?

L Not this one. I want this to be quite high & straight backed. Because you can already get reclining mechanisms which I could buy in and use it in the way I want. But its already there, its been done, so I thought I'd do something that is cheaper that a recliner… just using standard fittings.

M I've got no head control on mine(wings on her chair) and you're heads going way over.

L Is you neck pushed forwards?

M Mine isn't the right shape anyway.

L This one (cushion) had got chip foam in so its squidgier. Is that a different feel?

M That feels quite nice, it feels soft at the top of my head. Its quite nice.

L That doesn't seem to push you neck forwards. That's got loose foam chip and the other has block foam..

M The top of my head's pushed forward more , a bit more. Oh, Lucy swap them again and we'll have another go on that one.

L Is it better with A or B?

M Oh no, that one, (Block foam) I like this one better. I'm away now That's it folks I'll see you next time.

D I think every chair that you sell, Lucy should have you there to set it up. You've got to go round and get it all sort of…

L It would be a great job wouldn't it.

M Custom built.

D Each one personally fitted for your comfort. A personal consultation.

L I want it to be so that you can set it up today and tomorrow if you feel differently you could change it. 'Cos you feel differently from day to day.

Took photograph

M Another picture of arthritis…

D Yeah, I said that the top (of the cabinet) level with the arms.

M I think everything's got to be the same level of the chair. I'm prone to things like that (knocking things over) If it is at different levels, I'll put something down and (gestures knocking something over)

D Its lifting your arms up high, you can't lift your arms up high. Have you asked her (M) about the wings (wrap) No, about those shawls.

L Well, you see M uses a coat as a blanket already.

D Oh right.

M Yeah, I'm all for wings (on the back support for head) If I know I'm really tired when I fall asleep, I have to be covered up, I'm daft really.

D Oh, do you?

M I feel the cold across here (chest & shoulders) and when I'm warm, I know that I'll go to sleep.

L But not like this wrap mock-up?

M Well, I'm neat

L Not sheepskin, something like fleece.

M Unless your cupboard here, you got out the magic blanket. Something lie a spaceman thing, spaceman suit…warm. I don't know, you know, what do they do…its like a sleeping bag.

I think I'm lying here for today now.

L What do you think about…when you get up, could you see if you would rather have wooden ends or softer ones.

M I've never thought about that, but I think its a good idea, to have wooden ends.

D You need something firm to push on.

M As long as the ends are firm, so you feel happy with in.

K

D Its a shame Z isn't here, 'cos she's into all this design (she's a graphic designer)

M I think you'd better ring her up and go and see her. Have I finished?

D Are you going to have a go now K? She (Lucy) wants as much feed back as possible.

L Is it about the right height under the knees?

K Having more padding on the seat

L It is firm because people in the survey asked for it to be firm, but

K Not so that it (makes you fall in) but a little bit more (soft) than that.

If it goes quite hard after a while… I haven't go a lot of padding (on her frame)

L The idea of the cabinet being high, would it be useful? Or would it already be catered for..

K Its quite nice having …(somewhere to put things) that had lots of ..phone

L Would it cause problems in a home environment of just you had a cabinet and everyone else had to fend for themselves?

D What if you had a cabinet and everyone else what?

M That's their problem…

D I mean, I have my armchair.

M I do that anyway.

L What about the leg length?

K Its all right actually. Usually when I sit down on chairs (there is pressure under the knee, which is painful)

L Can you feel the back of the chair in you lower back? Is there a space?

K Its difficult to tell, its too far back.

L I've got two different cushions.

K Its still too far back.

L I don't think I can do anything about the tilt of the back at the moment. The tubes just over-stretched . I'm just looking at something for the back of your neck. If you could lean back on it, is that uncomfortable?

K Yeah

L How about with that one as well (Both sacral cushions)

K That's too much, but that would be more…If the chair was a bit…then you just want something… Its too high

L Can you put your feet flat on the floor?

K Just about. I've got a stool which has got rungs on.

Poor quality recording/ other noises override conversation.

L You know with your legs stretched out in front. Do you do straight leg raising?

K Yes, I've only just started doing them.

K mentioned cleaning timber on chairs. Putting her fee on to the footrest, not at 90 degrees but less. Putting her feet up at 90 degrees was not comfortable.

Reaching and twisting for the wrap would be uncomfortable.

Interested in cabinet at lower level.

Seat didn't look comfortable

wanted a warmer colour pattern

L It (the chair) look quite slabby

K Yeah, yeah.

L So it wants to be more plush. I've just thought, what do you do with you stick?

K Well, when I'm at home I don't actually use it too much. 'Round my own home I know where I can lean but when I'm out places its a case of finding a place to prop it up.

L These dangly down bits, which are just sort of patterns, which is why they're not nice fabric, but if they come down the back attached…So you get the chair like this with your choice of fabric as a tight cover. This is a loose cover option, that you pull on, and it would attach like that (diagonally on back-edge) So that it if you get chilly if 'an evening' you can just pull it round just reach round, one side. I mean its just like having your cardi' around your shoulders.

K I wouldn't do it, mostly because I'd have a job to reach.

L If its here…

K I'd have to pull that all the way around. There's a lot of moving. I usually have a shawl over my shoulders so if I'm cold I'd use that, I don't like to feel closed in.

L I think that's a quite major thing, the thought of feeling snug, or you just don't like the clutter.

K I like the fact …..like a shawl, but just around here (shoulders) so 'I'm still free.

L So you feel. Do you ever put a cover over your feet and legs.. a similar kind of idea, stating about here (waist level) that just went over, either from both sides or one side.

K Possibly one, I wouldn't want both, or I'd feel trapped-in.

L If you had some sort of shawl and kept it in the cabinet, would that be satisfactory?

K Yeah

L That would solve the problem.

K And to be honest I'd rather my chair looks as normal as possible, so if it had drape..(this wouldn't be normal) If it went all the way down?

L I've got some ideas for the cabinet…I've been looking at ideas for a cabinet where its just like a filing cabinet with drawers, or a cantilever, so that's there's space underneath, but maybe it looks a bit hospital-like? This is where everything swivelled out on a post and it would have a reading rest thing a place to put a book, like a music stand, that idea.

K I use one of those lap trays I use one of those to prop my book up on, 'cos I can't hold a book.

L Same as me…thumbs. If that swung out of a cabinet and you could push it back. Would that be…

K That means you've got to have the cabinet right, up close, which might not be possible. I mean, my tray I just pop down the side, which of course……

L So, if you can just put things away in the cabinet, is that better?

K And if the cabinet looked like a nice piece of furniture, It would actually look nicer.

L Thinking along the lines of the pedestal, using the same base configuration, some sort of mechanism and this is a round one (cabinet) you would have anything to trip over because there wouldn't be any corners. So that could just be open, and that could be a drawer and that could be a pull out surface. This is a square version.

K With it being open as the bottom you've go to be able to reach down to get in…

L Yeah, that's a problem?

K I think its a quite nice idea but as I say,

L Would you have any preference to the cabinet being round or square?

K No. That's quite unusual.

L Its round, so that it wouldn't matter if it swivels, you wouldn't fit much in it, its just like a round table. Its a surface with that added bit of the drawers. So you sacrifice quite a lot with it being round.

K Of course, if you do it that way, you lose a lot of space.

L Yes that bit in the middle. You think that's a useful bit? (Centre volume which is empty)

K Yeah. If it takes up space with furniture you might as well have it..

L What happens if it was cylindrical? Same effect as that but round, So you could still have your pull out surface, and maybe have this video cabinet idea(of half depth shelves) (So you reach in from both sides) Where you've got shoves around the both sides and round the back. There's another things as well.. you see the rounded edge around the front apparently when you reach, if you reach out in neutral posture (with are out)its supposed to give you more strength and less strain on your joints, if you pull things (by the posts) to you rather that twisting your wrists and pull. Same as if you're pushing a push char like that (neutral) as opposed to that (with wrists rotated)

L 6 inches off the top, of the cabinet. That's been really useful actually. Is it (the seat) starting to feel hard?

K Its not as bad as I expected it to be, its to do with the way it looks it should be..

L Plush

K Yeah, that's the word, plumpish, but firm

L That's how three piece suite look plusher and plump..

K The trouble is, that when you sit on them and you sink into them and then you can't out of them…Yes, it looks hospital type..

L That's exactly what I'm trying not to do.

K Sorry.

L Maybe I'm trying too hard, maybe that's why.

K I'm being critical.

L Yes, I can see it, but I can't see why (it doesn't look comfortable) It looks to me 'slabby'

K I think its the firmness of it.. and I think maybe the straight edges. If its got wings which..

L What about this kind of thing like a futon (wadding arm covering)

K This is Lucy's chair

K's mum Oh, Hello

K We're all having a test out to see what we think.

L Have a seat

K Well you've go arthritis in your knee. This is the expensive cabinet…

L Its a bit like 'Blue Peter' Do you want to put you feet up? You could pull it closer.

K's mum Does the back adjust?

L No the tubing's strained, its at a greater angle that I'd like it, is that in the right place (head rest)

K's mum I like the back rocking.

L Its not really supposed to.

K's mum Oh, I thought…

D Yes I thought that, like those cinema seats.

K's mum I thought that was part of it.

M Can we have a rocking chair?!

L Because it creases, its more informal (wadded arms), does that give an idea of comfort and where its tight: formal?

K That's sort of soft but the firmness underneath. Wings, not huge wings…I don't know whether they should be just there (at the top of the back) or down the whole thing of the back.

L When you say small do you mean not full length?

K I'm just trying to think.. some of them just have a wing here and at the top, some come all the way and taper.

L I'm quite surprised that everyone's keen on wings I haven't sat in a chair with wings recently, so I don't know what they'd feel like, but that's an idea.

K It looks bare without them (wings).

K So this is optional (head rest) Its nice to have a back that's adjustable that you can put where you want, because some of them are put on and that's it, you can't

move them to where you want them. How are you going to do this bit? (arm) Will it be straight or?

L Well I think the next version I make of this is going to be laminated one piece of timber. At the moment its two pieces that are screwed at right angles with a horrible bracket that you can't see.. Oh you can, ahh, well its horrible

K&K's mum laughter

L The next one will be thin bits of wood, glued over a mould so you get a nice curve. But takes quite a bit of making, so I thought I'd try it first and see if it.. if its curved wood I don't know if I'd cover it or not, but it seems to go quite well.

Especially on the edge but do you see the wood on the outside, it reminds me of a go-cart, that's what I think..

What would look better here? The same fabric? On the outside, or a colour?

K Are your having this straight up, as it were, with the arm out here?

L I did wonder to have storage here (under arm) but its quite tricky to get at. Do you remember 'Jim'll fix it's chair? With an arm with stuff in, it could be like that you pull a drawer out. But you've got to twist. But you've got the cabinet I suppose.

K's mum What cabinet?

L You mean you didn't realise that was a cabinet (pointing at the cardboard mock-up)

K's mum No I thought it was a box

alternative tilt mechanism

K's mum Do I just turn it foot stool

L No its got a gas lift, which is a bit tricky (Without the extension lever)

12.4 Transcript of visit to Z's house, 27.2.97

I took with me the chair/ footrest and cabinet mock-up which I had cut down.

Talked about the evenings ageing about 50 years when the steroids wore off. Here Parker Knoll chair, £1200 doesn't fit and there's no lumbar support. The Parker Knoll chair back is probably as tall as my chair back, but because its so wide it doesn't look so tall.

The bed/settee is on 'road cones' which are plastic cones to raise the seat up. Her third piece of upholstered furniture is a pouffe but its too heavy to move and could do with being on casters.

Got footrest (£60 a while ago) from OT's for use at work

D, M, Lucy: L, Z, Mk

Quotes are general text, my thoughts and clarification of object in parenthesis.
Conversation is edited only to remove uhmming & ahhring

L The arms, this one's (lollipop arm) a later version than that one (bare ply) and the idea is that its big enough to rest your arm on and you can put a cup on the side. It's just constructed in a different way to this one. I will order a new one of these and it will be slightly wider, same a soft curve. Same width as that one (the lollipop arm at the back) without the lollipop bit on

Z so you can actually clasp it, more substantial, to get the leverage so you can push to get out.. This ones fine except you could have a cup on here, I know its padded you might actually spill it if your dexterity's not very good, you might knock it over.

L D said she would rather it be wood, at the end, for getting out to stop her slipping so much.

Z Yes, yes. Its padded but it isn't too bad actually. You've got something firm underneath it (the area where you put you hands on the arm). It might be better if you had a wood edge. It might look better as well. You need something firm to push on, very firm.

L What're yours (arms) like on your chair (Parker Knoll), are yours upholstered

Z But if you try that one, you'll see that it is well padded, also in that particular chair its electric and its an incline/recliner, so you don't have to push down it does it for you.

L It pushes you out

Z so its not at it highest at the moment, it does actually there's no need

L I know they exist, its an existing mechanisms, so this chair would be a version before that kind of thing. It would be an economy version of that (Parker Knoll electric raiser/recliner) *(although I'm not sure I really believe that. I think it would look better, more contemporary. It fulfils different functions to that)* A different kind of…

Z For someone at a different level of disability, maybe at an early stage or a different health?

L But M was saying she likes recliners because she can tip her head back and go backwards. You don't need strong arms

Z I mean, I've got an electric one because I'm not strong enough to use the mechanisms. With those, Parker Knoll or what ever, you have to pull a lever and push

L And you say that's (electric Parker Knoll chair) specifically for evenings?

Z Different times of the day, late at night when I'm not feeling as well, wound down and the steroids have worn off. I'm not able to get out of a chair.

L The original idea, was that there was room enough for a cup of tea there, it was going to be upholstered slightly differently, so it had a rim around. So this one's on its way out, this idea.

Z I quite like this idea of this bulbous bit here. Because it does give you more to grasp. But then again, I'm laying my whole arm down, to my elbow, and I'm not going to get out like that. You're going to get out like that (pulling at the front) Its nice having that expanse of area to press on…

L It gives you more options?

Z …It makes you feel a bit more comfortable, whereas this thinner bit doesn't

(a laminated ply arm was attached so I could assess its constructional merit. I wanted to test with Z the comparison between the right-angle arm and the laminated curve, and apparently it didn't make much difference.)

L This (the laminated timber arm) is probably here for my benefit more than for yours, so I can see how the construction would work. It would be upholstered in the same fashion.

In terms of the seat length, the back to under your knees, how does that feel?

Z It feels all right and I think most chairs are about that.. it could be a little bit longer, only perhaps half an inch or an inch, but that would support behind the knee more. But then I suppose you would have to be careful that it wasn't too near the knee. Particularly with arthritis, if someone has swelling behind the knee, which you do get behind the knee, as well… yeah, just half an inch.

L What about the width, do you feel a bit lost in it?

Z A little bit lost, but…

L How about with a side cushion? Or would that be too much?

Z It would be in the way.

L Right, OK. And bearing in mind that one side is yet to be upholstered. Do you feel … You look the right proportions for it (the chair)

Z I do feel very comfortable, its an ideal height. I've got my feet on the ground, and my feet are flat, mind you I have got shoes with slight heals. But yeah, fine height -wise.

L Right, and this-here cabinet(card mock-up) How do you feel about that in relation to the other pieces, from where you are in the chair. If these were three drawers, how about grappling for things in the first drawers, the top drawer?

Z I would probably use the top drawer, but I wouldn't use any of the others.

L Right. Is that the bending down?

Z I wouldn't want to bend down. Maybe the second one, looking at it. It would mean bending over. Maybe later in the day, I wouldn't use that second drawer. So the top drawer, maybe something a little bit higher. Two shelves here. You know, I could have my telephone book here and my glasses on that, rather than having to bend down and pull it out of a drawer

L So, at the height of the arms and perhaps a little bit above.

Z About three inches.

L And with it swivelling, and also I wondered about having a surface to pull out, maybe for writing.

Z Yes.

L This is a bit low now, I adjusted this (the card mock-up), this morning after the comments the were made a the Ladybridge. The consensus was that it was a bit high.

Z what was, this?

L It obviously depends on the height of the chair

Z And everybody's different. And I think with a lot of chairs manufactured they will (alter the height). That electric one (Parker Knoll chair) I've got, they didn't come and measure me. But if you go to somewhere like…

L Didn't they?

Z No, which is wrong. Because if you go to somewhere like Keep Able, they do measure you up, they do take measurements of your leg length etc., and they do consider how much a person weighs. Because they can alter the chair, so if you went into manufacture, it would have to be adjustable.

L Well, hopefully these components will make it adjustable.

Z Well, that's fine.

L What about it (the cabinet) being flat? Do you think it needs some drawers on top or something, does it wants something to stop things falling off the back or would you prefer it to be a flat surface like a table-top

Z That's an idea, you could have some sort of boarder around it at the top to stop things falling off, because things do late at night, when I'm not moving about as well. A ridge or maybe a little boarder like that in the kitchen (A flat pierced section (80mm deep) on the underside of the work surface) Like a galley rail.

L Yes, so its decorative and functional.

Z Yes, so design-wise it would open up more scope. It would be more practical.

L Do you use your stick in the house?

Z No.

L 'Cos I asked K and she said she could lean on things around her. Because I was thinking of co-ordinating something like (a raised edge at the back of the cabinet) that with a hook or a rail, or something.

Z I did used to use a stick at some times in the day and it was always ending up on the floor.

L Yes, I've seen K's do that a lot.

Z And they're a real pain. I don't use one now, because I'm not able to because of my wrists, I would not be using those kinds of walking aids. If things got worse then I would be using a wheelchair. It's the nature of this disease. In different diseases, or at the beginning (of the onset of a disease) a grip or something to hold a walking stick or for holding other gadgets like the Helping Hand. Also from a more practical point of view, if this thing (cabinet) is going to be made of wood, maybe a tile insert, I don't know? Where you could put a hot drink.

L I think if its finished with a Polyurethane lacquer it should be fine.

Z I like the idea of a head rest on it as well, there wasn't one on that one (Parker Knoll) You do need it. If it is going to be an adjustable chair. It not actually going to be a recliner, is it? Its going to be a static chair

L No. The seat and arms can go up and down, and the back moves forwards and backwards the seat depth can be altered but other wise its a chair-chair

Z Oh, so its going to be altered width-wise and height-wise.

L So basically its just made to fit. That's the only special thing, and its a tall backed.

Z The tall back is good as well. Because often when I tried suites out, I know I made the mistake with that one, you do need something to support your neck. A lot of them stop short, just above your shoulders. Its nice to have something for your neck and head support.

L I don't know what you think about this, this is a foot rest. It's actually a full length leg rest, and again its on the same kind of spindle, so it goes up and down. So it can be really high (Raise the footrest) I'll just adjust it. It has a slight gradient on it. There are brakes on the wheels, like a library stool, you put you weight on it and it locks.

Z If someone's going to put their legs on it its not going to move away is it?

L No, it wouldn't. Would you use something like this?

Z Yes, but seeing you alter it, it looks very difficult to alter.

L Yes, for the prototype I have an extension lever on. To raise it up, you touch the lever and it comes up. But to go down, you have to put weight on, which is awkward. I haven't worked a way around that yet. There is scope to change the height. But presumably once you have it set, you pretty much leave it at the same height.

Z You would, but I think with a leg rest, say you have surgery at different times, you would want to change the height. Because I have a foot stool in there and I can tell you I have changed it a couple or three times.

L But do you change it from day to day or is it a block of time.

Z No, a block of time.

L So, for instance if you didn't change it, someone else could change it for you?

Z Yes, yes somebody could.

L Its not ideal, is it?

Z Not ideal. You don't want, particularly, someone else to change it for you. You might want to do it yourself. And you might have to wait a week for someone to come and change it.

But then again, I think the concept of it being a whole leg rest it a good.

L Would you like to try it? It swivels round.

Z I'll try it. It is good, because the whole leg rests. It keeps your joints level. If you use a foot stool that's lower, you have to sit with your legs slightly bent, and that's not good. You need to keep your legs straight and that's good. Its a nice height. It is actually forcing me to keep them straight. Its keeping the knees locked.

L If you push it (leg rest) right back to the seat it should support underneath. I don't know if that's convenient?

Z Yeah

L So it should take the stress of the joint.

Z I like that idea of the whole leg rest.

L How does it work with your feet and ankles? Is it (the leg rest) pushing them up?

Z No, they're going down slightly. I've got nothing against that at all, its about right. Although it does seem to be sloping at an angle.

L It does have a 4 degree tilt which is integral with the mechanism.

Z But if it was tilting the other way it would be uncomfortable, so this is fine.

L I've tried it (the chair set up) with other people, and it actually tends to be people without arthritis who say, 'it pulls at the back of the knees'. So they put one of these cushions under their knees. M did it and D said 'You shouldn't do that', and she said 'Oh, no, its quite comfortable'

Z Yes, D might be saying that because she's had joint replacements

L Yes. Its interesting that people without arthritis tend to feel a pull down the back of the legs.

Z People with arthritis their knees tend to fix in a bent position.

L Yeah. Like Mk's.

Z Mk's are like that and I was like that. My knees were bent, 10/15 degrees and fixed and I would put something behind the knees to exercise and press down on them. Which was great, because you couldn't get them down to be supported like they are now. Maybe after joint replacements you are even more conscious than you were before. You know there's a reason to keep them flat. Maybe someone who hasn't got that sort of complaint, their knees do lock, when they walk, automatically.

Its different for different disabilities. I suppose its like when you're in bed, people tend to bend their knees. The O.T.s (Occupational Therapists) say try lie on your stomach with your legs flat. Or lay on your back.... (telephone rings) Yes, do that's very comfortable. But I haven't seen a foot stool that full length...

L The one (footrest) you've got here, is that for long-ways or short-ways.

Z I use it short-ways. But I suppose you could use it the other way round. That was prescribed by an O.T. And its good because its quite light weight its not too difficult to alter, you just push those little buttons in. It can be a little bit…

L Can you tilt it?

Z No. It would be nice if it could tilt.. I mean, this one you've produced does tilt.

L Only slightly. I want a mechanism that tilts and locks, but I haven't found a mechanism yet.

Z I'll tell you something with that foot stool I often, not kick it, but push it out of the way, because its light weight. I'm able to draw it up to me and draw it away, ever so easy because it is light weight. This (leg rest) feels quite light.

L Not quite as light as that one (NHS).

Z No, no quite because its a bit bigger, isn't it?

L I have plans to make a mechanical leg rest, with a motor and a remote control so you put your legs on and press a button and it would come up. But it would actually out-cost the chair.

Z Ideally, I'd love something like that. Because, to use, I'd find it extremely difficult levers and other things when you needs some force and energy to do it. It would be really nice to have something electric, hence the reason I have an electric chair and bed because its such a struggle to get out of them.

L What happens in terms of costing?

Z Well, the cost of those two items was thousands pounds, its disgraceful. And unless you save up, which I had to do, you wouldn't stand a chance.

L Knowing that this isn't electric, how much would you pay for a chair like this?

Z Just the chair? Oh, about £400-£500

L And proportionally, how about with the footrest?

Z about £150-200

L Yes, that's my feeling that the footrest should be about half the cost of the chair, if not less.

Z But marketing the chair, maybe you could produce an electric version. Because there are people who can afford it. There are people who buy electrical products, and would prefer something like that. You might have a big segment of the market that would buy one more manually operated. And then that would also cover people who just cannot operate it.

- The batteries ran out…

Next I tried the day blanket out. Z felt that she associated it with illness and invalidity. It was too big, although her feet usually poked out, and they didn't with the day blanket. She was concerned that she might trip over it, or it would fall off the chair, and it would be difficult to pick up. It was cold on the lining side but warmer on the woolly side. I was surprised when she said that it didn't 'go' with the rest of it. It wasn't the same texture but the colours matched. May be it if was the chequered fabric on the inside and the figured upholstery fabric on the outside?

The wrap idea seemed better to Z, because they were smaller and she wouldn't trip over them.

We talked about the cabinet having suspended files. Z said she already had two trolleys, one with suspended file and the other was for art equipment, with little drawers and compartments for pens, brushes and paints etc.

12.5 Selected comments made during pilot testing & design meetings testing mock-ups

The views of the user are taken into account via direct comments made while testing the mock-ups:

Adjustable chair suited smaller than average woman

M: Liked the fact that she fitted the chair, her feet touched the floor, and the seat wasn't too long. FF

Perceived difference in taste for different ages

C: If its for older people then cover the timber and make it look fatter for younger people leave the timber exposed and leave it slim. FF

Jn: If its for young people it could look really funky. FF

Grip for rising from chair

A: Its nice to be able to get your hands over the edge, right round the hand grip. FF

Colours

Lsl: warm colours, light & dark green fleck. FF

Swing legs round elegantly

J: '…I think to have it like that (the leg rest positioned further away) To be able to swing your legs round much more elegantly, especially for women.' J&M

Seat short:

J: 'The seat is a bit short: I'd still prefer the seat to be a bit longer (At least 5 cm longer) J&M

Shoulders exposed

M felt that the back left his shoulders exposed, wings might solves this:

L: 'Yes your shoulders are just a bit outside the profile of the chair back. Does a winged chair feel better?'

M: I don't know, it feels a bit like a car seat, they tend to have more padding on that come around the shoulders' J&M

Prefer knees bent

M: 'I would find it more comfortable if my knees aren't completely straight… I've inherited crap knees… This is how I find it more comfortable, its like when I'm in bed, this is how I'm more comfortable.' J&M

Wrap

J: 'I don't really like the idea… I think you'd have to, I'm looking at the colours here, try and make it looking stylish… Make a feature of it, not make it as a separate thing, make it part of the chair. Because (otherwise) I think it could get to be lots of bits, it needs it be integrated somewhere, you need to get a continuity of fabrics and surfaces.

One thing I would say. If its aimed at younger people then I think the idea of having a wrap around your shoulders is very old fashioned.' J&M

Fabric

'L: I think the day blanket has got to be really washable, because you could be sitting with your legs out like that, eating you dinner on you lap and I am aware that people will spill things.

J: I think choosing fabrics would be an important thing.' J&M

Base

J: I think the main thing is the chair, so that you shouldn't draw attention to the feet.' J&M

Arm

M: '…you could put your TV remote control here….

L: I did another arm with a half round shape, without the cut-out

J: I quite like this one, you can use the hand rest.

M: I like the style of it.' J&M

Padding

" I'd like more padding on the seat, because I'm prone to pressure sores."

Stick storage

"I did use to use a stick at some times in the day and it was always ending up on the floor… a grip or something to hold a walking stick or for holding other gadgets, would be good."

End of Arms Timber

"It might be a good idea if the end of the arms were wood." So a reliable, firm grip can be made getting in and out of the chair.

Practicalities of cleaning

V: Chair should be on casters. People will want to move the chair to clean behind it. FF

J: Cover the timber with upholstery fabric, other wise you would have to clean it. You can Hoover upholstery but you have to clean timber. FF

"If there was bare wood on the chair it would have to be cleaned & polished more often than if it was upholstered, you can just Hoover upholstery." FF

Rising from chair

"Late at night, when I'm not feeling as well…I'm not able to get out of my chair."

Adjustments to furniture should be easily made by user

"Say if you have surgery, you'd want to change the height of the foot rest. Its not ideal if someone has to do it for you, because you might want to change it yourself or you might wait a week for somebody else to do it."

Wings

"I like wings, 'cos I go to sleep in my chair'

Blanket

"I feel the cold across my chest, and when I'm warm I know I'll go to sleep….If I know I'm really tired, I have to be covered up"

Once people are shown the possibilities that can be achieved from a product that is applicable to them and that they can identify with, their imagination blossoms. In discussion with the last person, who talked of needing to be covered to sleep, I learned that she currently uses her outdoor coat as her cover. In exploring other solutions a creative thread emerged:

"From this cupboard here, you could get out the 'magic' blanket… something like a spaceman suit…warm and light, like a sleeping bag."

Pocket in Upholstery

"Is there going to be an inside pocket? (in upholstery of the arm)"

Recliner? "Are you going to do it so it reclines as well?"

12.6 Summary from workshop at the Doing Disability Conference

Comments from disabled and able bodied people, Leeds, 4.9.97

12.6.1 Suggestions

- You could have a table that locates on the disc arms
- Longer wings on the chair back considered to look better than the short round ones.
- Put a bung in the cup rebates, with a finger hook so that it becomes a flat surface for writing on.
- Instead of having a cabinet you could have a soft large fabric bag by the chair which the person could take out with them.
- If you took the clinical look wings on the back, discs on the arms and changed the colour then the chair would be OK.
- Request: That the footrest was lower.

12.6.2 Comments

- The cup rebates make it look like we can't even be trusted (not to spill) with a cup of tea.
- Seat was good and firm.
- On visible casters: obviously functional
- Flat pack, low quality that it wouldn't work, although it keep that cost down and it is good for moving around.
- The cabinet looks chunky and built to last.
- Hospital furniture, looks cheap.
- Orthopaedic seats are sparse, metal tube and vinyl covered.
- The stick top looks like a handle.
- There is nowhere to hang your hand bag.
- The cabinet may be for an older person.
- The chair looks like an office chair. I wouldn't associate it with comfort.

- Matching 3 piece suite you would still have to have a settee in the same style (as the traditional style)
- (Beginning of this comment unrecorded possibly) ... it looks useful/ or I would use it… and ends 'Yes, but I'm not house proud'.

12.6.3 Costings

- If the cabinet had wooden handles then people would pay more
- Footrest should be one quarter of the chair.
- Chair £300, Stool £75, Cabinet £125 with plastic handles, £150 with wooden handles.

12.6.4 Marketing theories

- Chair and the footrest a package. Each piece would loose part of their value if sold separately.
- You would sell more of a chair/ footrest package.
- People would be discouraged if they had to buy the cabinet in with the chair and footrest. The cabinet would be sold quite separately.
- If the chair had piping then this would speak of quality. People would pay more for it.

12.6.5 My own observations

Although the project was laid out at the back of the conference hall the furniture was assumed as theirs and free and used. Not like it was in an exhibition or design show.

A cup of coffee was put on the table and left a ring.

MB, using a wheel chair, happily used the footrest to put his legs out on to.

I interrupted a conversation between AR and MB. When I asked for comments M said the cabinet looked like a bed side table. A said it looked clinical.

MO used the handles of the cabinet and said that he liked them. The arms would need to come up for a side transfer. The cabinet would be OK in the kitchen stained darker.

The chair should offer different options. i.e. side transfer for wheel chair users such as paraplegics, also the non-uniform hand grips.

Good design depends on taste and setting. Cabinet might be OK for a spare room. It would need to be wider for a living room. The chair design looks 60's. It would be OK if it didn't swivel, if it didn't have the discs on the arms.

I think when you ask people about a product or piece of furniture they will immediately think of it in the context of their own home. Not in an abstract context of 'good design' or 'design features'. The process probably goes something like: cabinet? Where have I seen this before, in the kitchen, yes you can push it around store things in here. Could be useful, Colour wouldn't match my home. "It would have to be stained."

If people have been in hospital recently or for a lot of their lives then they will have a visual vocabulary that is 'medical', 'hospital' and 'clinical'.

12.7 Transcript highlights of interview with ergonomist Professor Mark Porter

12.7.1 Dynamic seating

12.7.1.1 Adjustable seat: tilting & swivelling but locking

'…the swivel which is realisable, I'm keen on, I personally would like to recline it. I think the change of pressure distribution would make it easier to sleep in it and everything else. Of course, it needs to lock into an upright position when you get in and out.' MP p17

'…I think both of those (Swivel & tilt) would be ever so nice. That would be a major plus-point. It would be much more attractive to the end-user.' MP p8

12.7.1.2 Swivel option an advantage

'So why non-swivel? …Actually its quite important that you can swivel …The swivel could be useful if you've got aches or pains: I'm sitting here and I'm doing this (working on the pull out surface) and when I want get up its much easier if I just swivel, spin it sideways and get on to my bed. Otherwise I've got to move that, get up and go this way, so I can see that you've got rid of the swivel for stability, getting in and getting out, but actually you've lost a bit of functionality that could be quite useful. Even, there's my friend, there's the TV, you know I want to be in different position, I want to sit facing… And even me, and I've got fairly healthy joints… If I sit watching the TV for a remarkably short time with my neck twisted then you get all sorts of muscular cramps and everything else. I would of thought that by having some sort of override on that tilt, so you could directly face the TV or a friend, look out the window, or to get on to your bed…' MP p3-4

12.7.1.3 Need to recline

'…I would want to recline, to tilt back, quite soon.' MP p11

12.7.1.3.1 Some tasks are forward leaning & others backward leaning

'…eating its essentially its a forward leaning task…. When you are writing its forward leaning unless you can tilt it quite nicely, and then when you are watching TV, on the phone, or sleeping then you want to move a way backwards…' MP p11

12.7.1.4 Avoid postural fixity

'…what is coming through from the ergonomics literature is that there is not a perfect posture. We do a variety of tasks, so the last thing we want is to be fixed in one position.' MP p10

'…postural fixity in a perfect posture is still a problem.' MP p22

12.7.1.5 Constrained posture

'…Then you have something called a constrained posture…in addition to being fixed in one posture, your posture is constrained. E.g. So you've got glare from there, the lights there so you hold your book this way, and the TV is slightly off, and the footstool is over here. So its forcing, not a fixed posture, but not a desirable posture.' MP p22

12.7.1.6 Encourage mobility with dynamic seating

'…I know people with arthritis have difficulty with being mobile, but probably the solution isn't to fix them in one posture it probably to keep them and encourage them to be mobile, as long as possible, or as a balance between the two.' MP p4

12.7.1.7 Postural fixity leads to pressure build up

'One of the problems you've got is postural fixity… healthy people driving cars, and four hours a day in a van and you've got big problems… they've got

postural fixity by being stuck here and then you get high pressure points where you've got to get rid of your body weight… It stands to reason if its in one place constantly then its going to stop the blood getting to the tissues, and stops the oxygen getting to the tissues and lactic acid getting away' MP p5

12.7.1.8 Dynamic seating distributes pressure

'…one way to change the pressure distribution is to tilt the seat forwards and backwards.' MP p5

12.7.1.9 Adjustable cushions promote different postures

'…in this context, you want to be able to adapt as many postures as possible. So I actually quite like the idea that its (the cushion) separate. Because it means that people can adjust it, and use it sometimes and not others.' MP p10

12.7.2 Arms

12.7.2.1 Prefer arms to be upholstered

'Arm rests need to be soft around here (elbow)…over a long period of time you've got an obvious pressure gradient here (Between the arm rest and the discs at the end of the arm)' MP p6

'…I am also worried about this pressure (under the wrist, where the arms disc sits above the upholstery).' MP p9

'…If you didn't have a use for them then I'd much rather have the upholstery.' MP p20

12.7.2.2 Arm discs a hazard

'…I would have accidents with this. If you put anything there, I would knock it over every single time and I'm not accident prone in the slightest. So I

would never put anything there, I would have a hot drink there (on the cabinet top) and I would bring that over to me. I can't see why that's there. Particularly if you make the seat tiltable and more dynamic…I think its a bad place to put it, personally.' MP p6

'…you're going to get in and out, and if you do fall asleep, or, you just shouldn't encourage people to put hot cups of tea, that close to them…' MP p8

12.7.2.3 Swivelling, moveable surface

'…You could virtually do with something that is another accessory that pulls out from here that comes across, and allows them to write. What about a tray? Has a tray been designed, to go with it?' MP p9-10

'…if you did want to stay with this (design for the arms) for whatever function it performs, it would be quite nice to have them (arm discs) easily removable.' MP p20

12.7.3 Front pull-out surface could obstruct access into drawers

'if I want to get something out of the drawer … That stops me getting in the drawer… it actually gets in the way. Perhaps if the things come out to the sides, for thing to put coffee cups on.' MP p6

12.7.4 Footrest

12.7.4.1 Leg support

'…I wouldn't stay in one place… It is quite nice with a tilt on you could have it either way or sideways. We don't actually need much support round here (under the knee joints), particularly if you are seated normally, you want to avoid pressure under the popliteal thoroser you've go the nerve and the artery and the vein.' MP p9

12.7.5 Additions to the chair: chitty-chitty-bang-bang?

'...stick on different bits, that go away in a special drawer....you may want a tray or a writing surface, but still want the possibility of quickly put it up and get it out of the way again, rather than have to dismantle it entirely.' MP p10

12.7.6 Testing sitting position over a period of time

'In all the work I've done on seating, we get people to sit in car seats and drive cars for two and a half hours, 'cos they'll often tell you, this is how I feel, but I don't, know how I'll feel two or three hours down the line.' MP p11

12.7.7 Designing for many different people

'...Where ever you fine tune it (a design), in one area, just think of the people who you design out, and if that, on balance, is the best decision.' MP p15

12.7.7.1 Larger the market group, the lower the cost

'...I'm sure a manufacturer would want it (the chair design) to work for as many people as possible, you don't want to reduce your sales. You could be doing a service even to the niche group you're talking about, because the greater volume of chairs being sold the lower the costs will be and the more generally available they'd be.' MP p16

12.7.8 Posture analysis to evaluate design of chair

'...So you might find that the shoulder's hurting and it could be the armrest that is too high. My neck is hurting, it (the chair) doesn't swivel. You have to tie it in with a postural analysis so maybe you would come back and see where it was set and ask them to look at the TV, take a picture...' MP p21

12.7.9 Reasons for discomfort

'Of course, there are other reasons, apart from arthritis, why you have discomfort and pain, there's cold draughts, there's tensions. It could be that the TV' slightly off. They are sat slightly skew-whiff in the chair. The chair can be fine but…' MP p22

13. Home testing programme

13.1 Home testing outline

13.1.1 Initial enquiry letter establishing interest into home testing

Lucy Poole at the University of Wolverhampton, Art & Design Department,
Molineux Street, Wolverhampton, WV1 1SB

Seating for Young Adults with Arthritis

Hello, I am a member of Young Arthritis Care. I have designed a domestic chair, a leg rest and cabinet as part of a research project at the University of Wolverhampton. Sponsorship from an Arthritis & Rheumatism Council's project grant: PO530, is enabling me to build the furniture.

About a year ago you answered my questionnaire on your seating preferences and you expressed an interest to test my seat design. I would like to invite you to test the furniture.

What the testing would involve

In order to get accurate information about the furniture, i.e.: if its comfortable, if it looks right, if it feels right etc. I am looking for people who are prepared to test the prototypes of the furniture in their own homes.

It would be for an agreed period, approximately two weeks, arranged in advance. The furniture will be delivered to your home and adjusted to the correct height.

During the trial period, a Dictaphone and diary will be supplied for you to record your thoughts and comments about the furniture as they occur to you.

If you would like to test the furniture designed for young adults with arthritis, you can use the reply slip enclosed with this letter and the prepaid envelop provided. Or you would like to know more about the project please contact me. I welcome the interest.
Thank you for your help, I look forward to your reply, Lucy Poole

Lucy Poole at the University of Wolverhampton, Art & Design Department,
Molineux Street, Wolverhampton, WV1 1SB
home tel: 01332 771614

This is a reply slip, please see enclosed letter

Any details stored about participants involved in the testing programme will only be used for this project and are confidential.

Please delete as applicable:

I do / do not wish to participate in testing the furniture in my home.

Comments:

13.1.2 Script for first telephone contact

Date:

Participant:

Tel No:

Hello I am Lucy Poole, I'm a member of Young Arthritis Care and a design researcher at the School of Art and Design at Wolverhampton University. I sent you a letter last March about being involved with testing some furniture designed for young adults with arthritis.

Do you have 5 minutes for me to explain what it would involve?

With sponsorship from Arthritis & Rheumatism Council I've been able to built it and now its ready for testing.

I'm calling you to find out if you are still interested in testing the furniture in your own home?

In order to get the most out of making the furniture I have structured a testing programme in several stages.

1 **Initial meeting:**

- I would like to visit you at your home to find where you are, parking, if I will need to negotiate stairs etc.
- I would like to do brief survey of usual/ existing seating arrangements
- ask you to complete a consent form (I'll keep one and you'll keep one)
- find out if there's enough space for the chair, footrest and cabinet. (I can provide temporary storage if its necessary.)
- I will leave you with an information brochure so that you can reflect on the testing.
- Can I arrange at time to visit?

13.1.3 Consent form: consenting to participate

CONSENT FORM

Testing a domestic chair, footrest & cabinet

designed to include people with arthritis

October 1997

Prototypes (working models) of a chair, footrest and cabinet have been designed following research on the seating needs, desire and habits of members of Young Arthritis Care who took part in a survey in December 1995. From the results of the questionnaire I have identified a need for a seat that provides the comfort of an armchair, provision for activities whilst seated such a surface to put a cup, somewhere to rest a book and be as adjustable as an office chair.

The furniture can be adapted to suit you.

The chair and footrest easily are height adjustable. The arms can be set at one of two heights and the seat length can be altered by moving the back.

What you will be asked to do/ how much of your time it will take

You are being asked to use the chair, footrest and cabinet in your home environment as you would usually use your furniture for approximately a two week period.

You will be provided with a diary, to be completed at regular intervals, containing daily pages, prompt questions and diagrams of various postures and the furniture. This is to record comments that come to mind. Once the furniture has been removed you are asked to maintain the diary and make entries over a further two weeks to make comparisons with your usual furniture

What tests will be carried out and what data will be collected

Nine other participants from YAC in Central England are also involved in the programme. Once everyone has given their comments on the furniture the results will be collated, the tapes will be transcribed into written text. The transcripts, diary entries and observations on how the furniture has 'worn' during testing will be used to critically evaluate the design of the furniture.

Any possible risks?

CAUTION CARELESSNESS CAUSES FIRE: As with **any** furniture that includes polyurethane foam there is a potential fire risk if the furniture comes into contact with an ignition source, such as an open fire or cigarette.

Combustion Modified foam has been used and the upholstery combination has been designed to meet with British Standards 5852: Parts 1(1979) Cigarette Test & 2 (1982) Match test.

If the furniture causes you discomfort….

The furniture should not in any way cause you any discomfort. If any part of it does please discontinue testing and let me know as soon as possible:

Lucy Poole, 29 Vincent Street, Derby, home tel: 01332 771614

Consent:

I feel happy to test and give my point of view on the prototype furniture. I have been given information on the furniture and I understand what the programme entails.

I know that I can discuss any aspect of the project with the researcher at any time and that confidentiality will be maintained at all times. The work is for study purposes only.

I know my participation is entirely voluntary. I am free to withdraw from the testing programme at any time without giving a reason.

Signed: Date:

13.1.4 Declining home testing

I received a negative response to home test enquiry letter. 24.3.97

TK declined testing because:

> 'I do not wish to participate in testing the furniture in my home as we simply don't have room for any additional seating as we have just purchased two large settees which the manufacturer kindly made 22" high for my comfort.'

'We had great difficulty finding a suitably high piece of furniture that looked like regular seating. I was tempted by those 'pop-up' chairs but didn't like the look of the seat being up when (one is, you're (sic)) not sitting in it. We are both very happy with our two and three seater settees because it is high enough for me to get out of even when I'm quite stiff and most importantly it looks great and makes me feel 'normal'! I'm sorry I can't try your furniture but which you all the best with you project.'

28.4.97 IJ declined saying:

> I would be interested in hearing about how the chair is going also when it is finished. I do not think I would be able to test it though as I am limited on space for furniture, unless the chair turns out to be a lot smaller than it looked at Ladybridge

13.1.5 Information for participants - second & third visits

Second visit - deliver prototype

- deliver on the Mon -pick up on the following Thurs
- Photograph chair installed with participant
- relocate existing furniture, if necessary
- adjust the prototype to 'fit' individual, demonstrate all of the adjustments
- leave information (brochure) on prototype with my details

  stress that they are ***working*** models so any spillages, breakages, wear and tear are expected and help evaluate the design
- leave tape recorder, tapes and spare batteries
- leave diary with pen and prompt questions in the form of a book mark
- Make sure the safety labels are included:

  Prototype A: The upholstery meets the 1988 safety regulations by inclusion of a fire resistant interliner.

  Prototype B: Filling materials and covering fabrics meet the requirements for resistance to cigarette and match ignition in the 1988 safety regulations

Testing Period

Record comments:

- on tape recorder (supplied with tapes and batteries)
- keep a diary
- **Interim phone call to see if everything if OK**

Third Visit

Collect prototype:

- conduct a post-testing interview, visual record of chair established/in-situ
- continue keeping diary to note any comparisons or contrasts with usual furniture

Return diary: post to me using stamped addressed envelope provided

13.1.6 Check list of what to take for visits

13.1.6.1 First visit

- First contact pack:
    1. address card
    2. arrangement/ direction sheet
    3. permission letter
    4. First visit interview sheet
    5. ARC leaflet (Are You Sitting Comfortably)
    6. consent form with ethics committee approval as front sheet

       (2 sets, one to be signed, one to leave)

- Tape recorder: tape/ batteries
- Camera: film
- Diary to arrange delivery/ collection
- Photo Journal
- Cut outs, footprint of furniture

  Cabinet-500mmx500mm/ 20"x20"

  Chair- 950mmx750mm/ 38"x30"

  Footrest- 500x600/20"x24"

13.1.6.2 Second visit

- **Tools**: screwdrivers/ adjustable spanner/ caster spanners
- **Camera:** film
- **Diary**: take out daily pages of chair format not being used
- **Prototype Furniture** (in black plastic bags)

  Chair, back, wings, filler roll, four 30mm m6 nuts for wings

  2x bases/ footrest

  cabinet with bungs in egg boxes (protect handles)

- **Soft furnishings** (in black plastic bags)

  blanket

  3 cushions: long cushion no flap, long cushion with flap, small cushion with flap.

- **Time sheet for assistants**

13.1.6.3 Third visit- collect prototype

Take:

- **Post testing Interview**
- **Tools**: screwdrivers/ adjustable spanner/ caster spanners
- **Recording Equipment:** Camera, film /Tape recorder/ tape
- **black plastic bags**
- **Time sheet for assistants**

collect:

- **Prototype Furniture**

  Chair, back, wings, filler roll, four 30mm m6 nuts for wings

  2x bases, footrest

  cabinet with bungs in egg boxes (protect handles)

- **Soft furnishings (in black plastic bags)**

  blanket

3 cushions: long cushion no flap, long cushion with flap, small cushion with flap.

14. Project overview - culmination of knowledge

The five years work spent on this project has shown me that it is possible, once stimulated, to find an ongoing interest in a particular study.

If I knew what I knew now, at the beginning of the project, it would have been a different project!

14.1.1 Need for well documented connections

This emphasises the need to document design research so that the development follows the metaphor of a relay race: passing on well documented details, trivial seeming aspects as well as substantial 'discoveries' because their significance depending on the objectives of the researcher/designer.

The writing-up stage has crystallised many of my thoughts and ideas. The thesis itself will act as a personal resource for some time to come.

14.1.2 Project limits

The skills in limiting the boundaries of a project come with the experience of doing project work. Depending on the situation, limits can be seen as restricting or they can be positive, motivating and welcome factors. Work can fill the time available, if that is vast and unstructured the it is possible for the work to mirror that. If time is in short supply it becomes precious, focused and directed.

It is not possible to include every relevant reference in a thesis. Indeed it is not possible to even survey all the information open to researchers with today's rapid information dispersal culture. So, what was considered important to this project was to review selected amounts and forms of information and discern its relevance to the project.

14.1.2.1 Limitations of project outcome

The design outcome would have benefited from more expertise. Ideally a team approach should improve elements of aesthetics, mechanics, marketing and business potential. A remote controlled adjusting foot stool remain in its embryonic form owing to the priorities to produce the six prototypes and accessories for testing.

14.2 Recommendations for future projects

This project could develop in several different ways, in association or collaboration with users groups, manufacturers, retailers or others.

14.2.1 Develop & refine the design of the prototypes

The chair, footrest and cabinet could be refined, continuing with the methodology and findings of the research, further prototypes could be made and tested with potential users.

Investigate the potential of the dynamic seating concepts as discussed by Professor Mark Porter's critical observations of the prototype.

14.2.2 Feasibility study

If the designs were to be considered suitable for possible production then various financial analysis would be undertaken. Specifying the cost of the raw materials (and the quantities it would be most economically purchased), the cost of producing of parts of the furniture (in-house or sub-contracted), overheads of running a business, production storage facility, the quantity of components needed to be bought-in, assembly of items, sales and promotion, distribution costs, product liability, insurance, wages for workers involved etc.

14.2.3 Detailed disability market research

Surveys could be carried out to examine how currently produced disability products are brought to market. How often do user surveys feature, and how much significance is placed, in product's development?

Exploit the use of mood boards more thoroughly.

14.2.4 Purchasing of disability products

Learning from the findings of the testing programme, participants became familiar with the furniture. Consider purchasing strategies, whereby the product user could try a piece of furniture, so it 'becomes part of the furniture', and accepted.

14.2.5 Develop seating design for different age groups with arthritis

Since arthritis affects children and adolescents, there would be interesting design implications for designing for this market group. For instance, should the seat 'grow' with the person? from child, adolescent to adult. Would the user want to buy extensions in following years? The furniture could have adaptable and interchangeable elements.

Owing to the growing proportion of older people in the population, another market segment to address would be seating for older people with arthritis.

14.2.6 Develop seating design for other users

Starting from specific needs of seating for younger people with arthritis, many of the criteria and the subsequent design work are relevant for other people with other conditions, and indeed for people without a condition.

With a design established it is possible to take an inclusive approach, rewrite the specifications to include other users of different abilities and ages.

14.2.7 Future title in the vein of social model

Perhaps future work would be better entitled 'The design of disability products with special reference to the **user's environment and products**.' In the social model it would not be user who should be scrutinised but the environment and products available to them.

'We must scrutinise the environment which may be excluding people in one way or another.' Liz Crow, (12.2.99), replying to my email titled 'New project outline'

14.2.8 Apply user participation methodology to other products

The user centred design development process, could be used for producing a different product, again for people with a specific impairment, other impairments or able bodied:

> Design and disability requires an understanding of contemporary disability issues in order to begin from an informed viewpoint, before 'typically medical' criteria are considered. Then, the intended user of product or environment needs to be identified and worked with. This should be done within an ethically approved frame work which acknowledges the value of the consultation and expert knowledge. Through consultations proposals can be vetted to find out if they are relevant, appropriate, desirable, representative of contemporary aspirations, culturally acceptable and then practicable, useful, feasible, creative & innovative. This sounds an onerous list. I think it is unlikely that the lack of information, which I conclude is the cause of many inaccessible environments and unusable products, cannot be bridged without thought and involvement...
>
> Adapted from Poole, L. (1999) in response to a thread on Disability Research Mailbase 'Towards barrier free architecture', ideas sent to Zoe Holland (5.2.99)

14.2.9 Develop user participation methodology to identify area of design & originate product brief

'What I would like to propose is to design products which work well for, are appropriate for and reflect the values of disabled people. Working from a social model perspective, if this is possible in design?...

What would be a very different approach, if the product to be designed was defined by a user group, out of an experienced need, designed and tested with the initiator's consultation. Does this sound an interesting idea to pursue?'

Poole, L (12.2.99) Reproduced from an email titled 'New project outline' sent to Liz Crow

Reiterating Mitchell's (1993)[5] suggestions of an equal partnership between designer and non-designer.

---

[5] "Collaborative design does not simply constitute the participation of users in a designer's process, nor is it collaboration solely among designers; rather it is a means through which designers and non designers alike may participate as equal partners in the design process, shaping not only the outcomes but the aims of designing as well."
Mitchell, C.T. (1993) Redefining Designing: From Form to Experience, p68

14.2.10 Other markets

Having worked from the general to the specific, following detailed design criteria it could be possible to investigate which other user groups could benefit from the established design.

The approach of working with an interested diverse user group, established in this study, would benefit the design development process of other products ?

14.2.10.1 Seating during & after pregnancy

Pregnancy alters posture and ability to sit in lower chairs. Towards the end of a pregnancy the hormone relaxin causes ligaments to become more elastic than they would normally be, to allow the skeleton to accommodate the foetus. During this period it is important to maintain a good posture to prevent over straining vulnerable muscles. The upright back, height adjustable feature of the prototype chair was useful during the last three months of my pregnancy, and at certain points of my home labour.

The mock-up has been invaluable used as a chair and changing mat for my baby. I have not needed to kneel on the floor, because the baby is at the correct height. Besides the practical facility of changing surface it provides a suitable platform for verbal and facial interaction and play for a baby who is lying down.

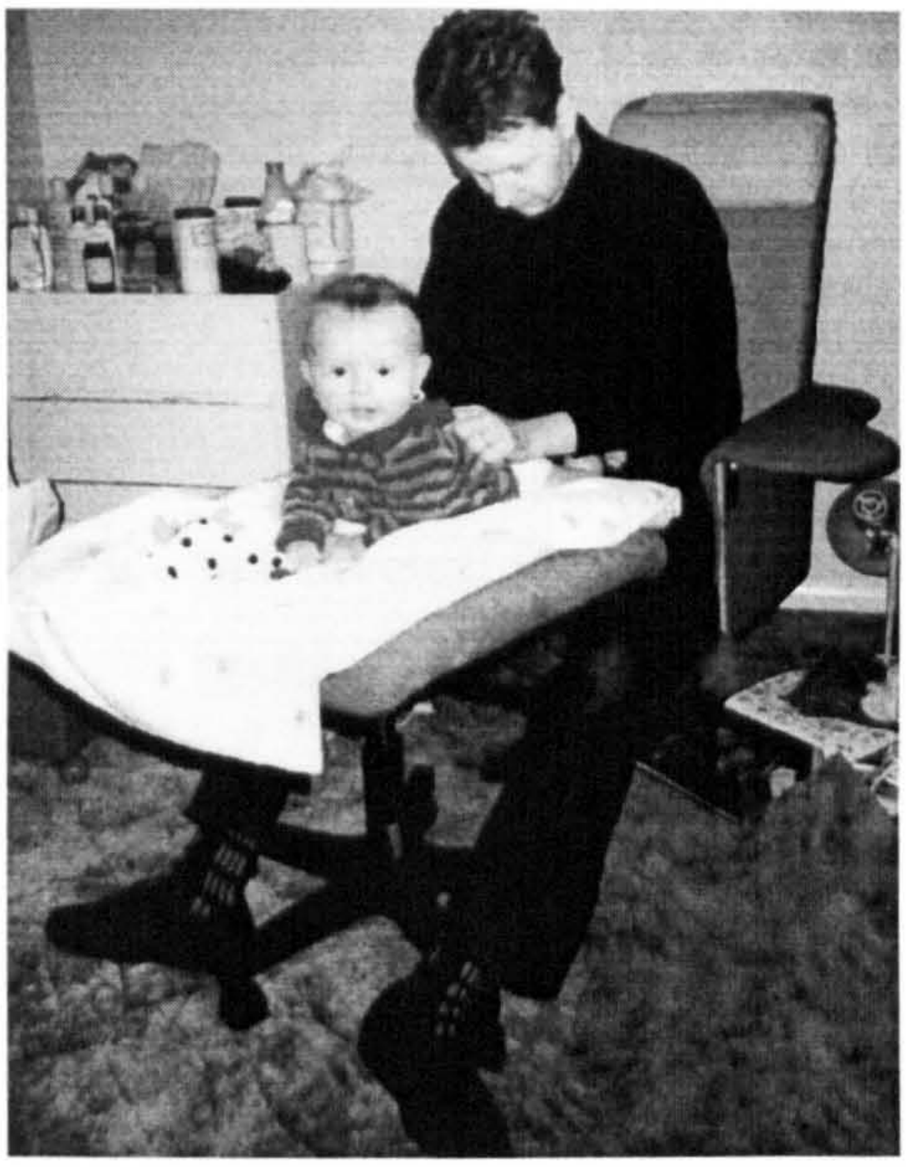

Figure 4. Chair and footrest could be developed for baby changing

15. List of papers published & public presentations relating to thesis

12.98 Does Practice make Perfect?, Practically Speaking,
University of Wolverhampton

6.98 Is Universal Design possible?, Design for the 21st Century Conference,
Hofstra University, New York

1.98 Project Summary for Arthritis Research Council Annual Scientific
Report 1997

11.97 Speaker in Product Design Seminar series, Bournemouth University

9.97 Doing Disability Research Conference, Leeds University

9.97 IDATER '97Conference, (Educational Research), Loughborough University

6.97 Design & Disability, Enterprise in Education Conference, Coventry University.

6.97 Open day for People with Arthritis, Walsall Town Hall